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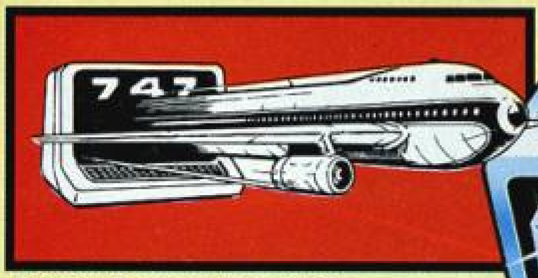
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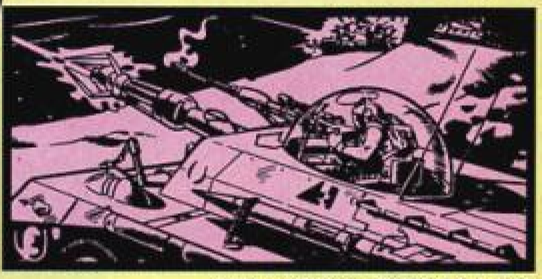
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I Obey, O Mighty One by the Great Ron Embleton

POWER TO THE PIXELS

"Power", Chairman Mao once said — in one of his more benign moments — "grows from the barrel of a gun". But then the Chairman had this thing about guns. If he'd lived to consider the possibility of a billion Chinese all thumbing away at their Little Red ZX81's, he might have amended that to "... out of the i/o port of a modern micro".

The potential for power in the near future lies with the computer-literate. This means you. They may wrinkle their noses sometimes at your penchant for writing and playing alienocidal (look it up) games, but they envy you your marksmanship just the same. And everytime you knock out a casual ON ERROR GOSUB they gasp at your cool and confident use of power.

Yes, power. The late Chairman believed in Youth, but he preferred Youth to be armed to the teeth. So much for him. We prefer Youth tooled up with Pixel Power to Youth toting around all sorts of lethal artillery. Besides, computing is ecologically sounder. Just look at China. Or — come to think of it — anywhere else, like Lebanon, where the Chairman's dictum has been taken to heart.

TONY TYLER

SPECIAL THANKS TO...

Sharon Henderson and all at Rediffusion; Gary Cartmell; Brian Wagland and Dave Notley; Eddie Babbage; Osman Ismael; Fraser Gray; Stephanie and Shirley; **Wordwise**; Kate Phillips; Speed Couriers; Adrian Boot and all at Island Logic; Cheap-o-Vend Ltd; Nicky Xikluna; and last and most certainly least Uncle Doug Church and all.

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is a genuine plastic, fully magnetized, free-spinning Data Slug, i.e., a jolly handy C15 cassette. Use it to store BIG K Games Listings or — if you prefer — the contents of . . .

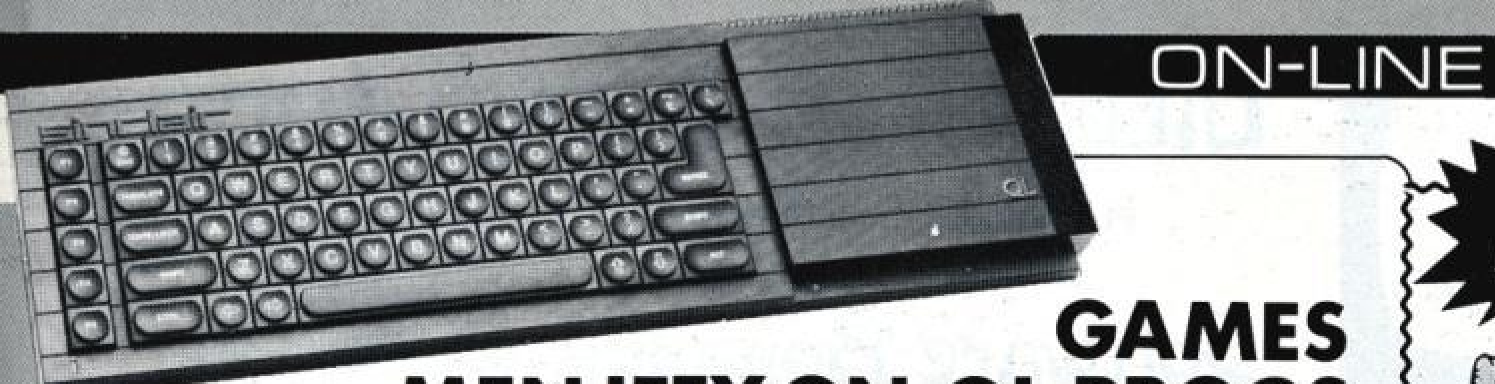
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GAMES MEN IFFY ON QL PROGS

QUANTUM LEAP may be the name, but as Big K went to press "Quite Low-key" appeared to be the watchword of the British games producers' plans for Clive Sinclair's latest — launched in January.

Most of the companies Big K spoke to would "like to be involved" in writing games software for the QL — particularly as the 128K RAM memory and Motorola 68000 32-bit processor means there are many more possibilities for new and exciting games — but at going-to-press time software house Psion was the only manufacturer to have immediate access to the QL.

This is because Psion was intimately involved with the QL's launch (they produced four business applications which come as part of the £399 package).

Psion's project executive Peter Norman told Big K: "We will definitely be doing games for the QL — we are currently working on some projects although it is a bit too early to be more precise.

"I think the potential for new types of QL games is just enormous and we can really start thinking of new things to do — by this I am thinking of exploring further arcade, simulations and adventure areas."

He did point out that it was not until the arrival of the Spectrum that games like *The Hobbit* were created, and therefore the QL could mean a new generation of programs. He declined to say exactly when these games programs would be announced or how much they would cost.

Scouse games house Imagine Software "does plan to produce QL games" — but had problems getting hold of a prototype. Director Bruce Everiss told Big K: "We have tons of Motorola 68000 experience and we could do QL games dead easily. But although we know what the machine looks like we've been told Psion is the only company to have an actual prototype."

Things were little better at Quicksilva — although a QL manual had been obtained.

"We cannot make any definite decision about programming for QL until we get the actual machine," explained Quicksilva's Project Director Mark Eyles. "But I do think Microdrive software might inhibit a lot of the smaller companies producing software — as it would involve a large capital outlay."

LEGENDARY MILLIONS

WHAT'S a good computer game worth these days? Around £2m. according to John Peel, managing director of Legend Software. That's what super-adventure *Valhalla* is reported to have grossed so far in sales on the Spectrum version alone. Not bad for a company's first-and-only release.

"The most profitable single game of Christmas 1983," claims Peel.

Already the "computer movie" (Legend consider their animated graphics process, Moviesoft, a cut above the "graphic adventure" tag) has been translated to the Commodore 64 with improvements all round in graphics and sound.

Legend's next offering is eagerly awaited but they are playing it considerably cool. "We're not going to make the mistake of producing a *Valhalla* clone," John told Big K. "We will follow with something spectacularly new."

Moviesoft, as it appears in the next Legend game, will probably be licensed to other companies for use in their own games. So prepare yourself for a whole new generation of adventure games where elements of the game almost take on a life of their own, regardless of what you are doing.

Flushed with the success of *Valhalla*, John Peel, crystal ball firmly in hand, gazes into the future of games software. "1985 and 1986 will, without a doubt, be the most exciting years in computer gaming." he told Big K. "With broadcasting-quality graphics, massive amounts of memory through video discs and the coming of Artificial Intelligence, there will be some incredible games around."





Valhalla's Peel: "Some incredible games". (Right) Some ace profits, too.

BIG K EXCLUSIVE



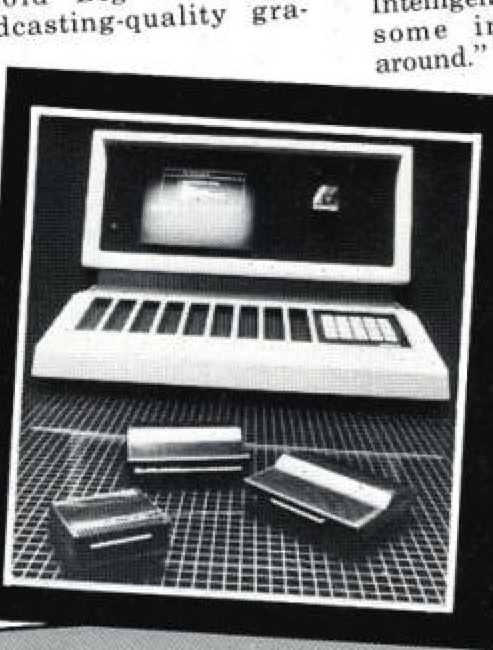
YORKSHIRE KEEP TV VIDEO SHOW UNDER WRAPS

by Paul Walton

BEFORE THE end of the year we may well be seeing an exciting TV gameshow based on computer technology on our Saturday-evening TV screens.

Big K has learned that executives at Yorkshire Television have been developing — under top secret conditions — just such a prime-time show aimed at the family. The project has so far been called simply VTFX (Video Tape Effects — geddit?) — but will be screened, says YTV Producer John Meade, under the all-embracing title THE GAME.

THE GAME will use a standard quiz-show format but will be "themed" according to the subject matter of each particular show. The first of these is to be called THE QUEST FOR ABIGAIL, and will be a mediaeval save-the-princess theme, with dungeons, dragons etc. thrown in. Competitors will have to operate a joystick in turn — on an elimination basis — in order to get through as many as three separate screens, all linked by pieces of pre-shot film and treated before transmission with devices such as the Quantel Paintbox and the Chromakey machine. The necessary software has been developed for the project by an Oxford company, Inside Software.



ENTER THE VIDGAME JUKEBOX

VIDEO-GAME JUKEBOXES are coming to Britain's High Streets this summer — in the form of a gadget which selects software from up to 300 titles in its store — and then programs a take-away ROM while you wait.

The gadget is called a Romox and is made in America — where its ROM-counterfeiting potential has been controversial. The jukebox installation will be available in computer shops, where for 70 pence a time punters will be able to view a game, and, if they like it enough, to pay their money and walk away with a personalised ROM cart on a "hire-only" basis.

The Romox system will initially concentrate on Spectrum programs. It is thought that, since Spectrums will only accept ROMs by means of a special interface, these might have to be purchased or hired by the customer.

GOODBYE TO THE BIG 'I'?



MYSTERY SURROUNDED the future of the Intellivision games system as Big K went to press.

Despite official denials that Mattel Electronics UK — the British end of the American parent company — have closed down, sources within the industry were adamant that the company has virtually ceased to exist in Britain.

Mattel's troubles began two years ago, with a series of ill-timed and badly-thought-out moves designed to get the company into the home computer business. The result was Aquarius: a cheap system with useful graphic abilities which was widely criticised for its low RAM.

Despite last-minute price-cuts, Aquarius has so far failed to sell in serious quantities and as a result Mattel pulled out of the project before Christmas.

Owners of the Intellivision games system (and possibly Aquarius) are therefore facing the serious possibility of a lack of future software and expansion peripherals.

The company were not available for direct comment as Big K went to press, though a spokesman for their PR company insisted that "while Mattel has been drastically reducing its plans due to the cancelling of Aquarius, rumours of a total closedown are not true".

ARCADE CLAMPDOWN IN THE OFFING



PEOPLE UNDER 18 may be banned altogether from arcades if political proposals receive the backing of the Government. John Wheeler, MP for Westminster North, last month led a deputation to Home Office Minister of State Douglas Hurd. The deputation — which claims to be acting on behalf of many inner-city councillors — says that arcades encourage truancy, gambling fever, narcotics addiction and many other evil phenomena. Wheeler wants the Home Office to tighten up its licensing laws in conjunction with local authorities so that the glittering, electronic sinks of iniquity can be severely controlled.

Proposed controls? A wholesale ban on school-age punters: restrictions on the numbers of machines; and overall limits on the numbers of arcades in any given locality.

Measures of this sort have already been proposed — and in one or two cases, adopted — in some of the dottier American States, notably Indiana. As a result in these areas the arcade machine industry has cut back on the flow of new titles, claiming that the cash returns don't justify continued spending on leading-edge technology. Similar moves have also been made in large Japanese cities.

We'll keep you posted.

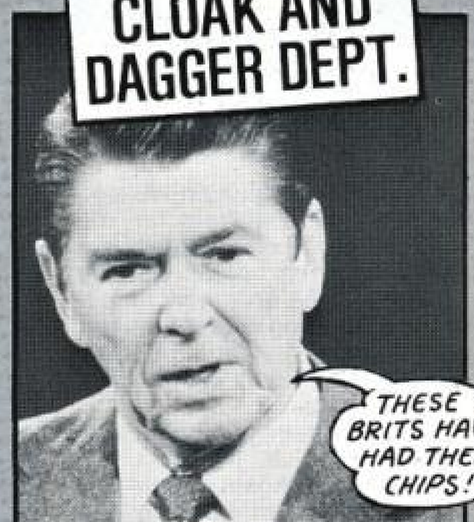
ONE EVERY 27 SECONDS

A BIG MAC delivered every 27 seconds — so promises mighty Apple for their new *Macintosh* personal hamburger, sorry, computer, launched at the end of January. A $20 million purpose-built, 160,000 square foot factory has been built in California just to crank out Macs for the masses. Integrated computer control systems, automated storage and retrieval systems and robot vehicles enable large-volume production to be carried out at the plant with a staff of only 300 people.

The *Macintosh*, originally thought to be Apple's stab at the "quality bargain basement" market, turned out to be little more than a scaled-down *Lisa* with a hefty price tag of around £1,800. For that you would get an extremely neat-looking unit with built-in black and white monitor, 3½-inch disc drive, 64K ROM and 128K RAM through a 32-bit MC68000 microprocessor (as used on QL). The only external devices are a keyboard and mouse controller. A large amount of business-orientated software (word processor, graphics, database, etc.) is included in the *Macintosh* and easily accessed by use of the mouse.



CLOAK AND DAGGER DEPT.



BIG K, ACORN AND THE HUNGARIAN CONNECTION

IF BBC computers are still rolling off the production lines today, it's no thanks to Big K staffer Paul Walton, who last month innocently precipitated a crisis which almost led to Acorn's supply of 6502 chips being cut off at source by the US Government.

It all started when Walton, 24, writing for another computer magazine in a freelance capacity, casually mentioned that the BBC Microcomputer (made by Acorn) was on sale in Budapest shops.

Sleuths at the US embassy — who apparently read each and every computer mag published (and good luck to them) — picked up this mention, checked the 6502 against the list of high-technology parts still exportable to Warsaw Pact countries in the light of the Reagan administration's post-Afghanistan crack-down . . . and found that it wasn't there.

With Walton's help, a desperate Acorn Computers then tracked down the person responsible for shipping Model Bs to the Iron Curtain.

The US Government curb seemed even more bizarre, says Walton, when it turned out that both Sinclair Spectrums (Z80 CPU) and the all-American Commodore range (also 6502) were being openly sold in the same Budapest stores.

Acorn have now been relieved from the threat of a big nix on their chip supply, after giving assurances that they will tighten up on their controls.

THE FIRST adventures to be produced like films rather than programmed like games are coming from Apocalypse Software: **Dreadnought Disaster**; and **The Mystery of Arkham Manor**.



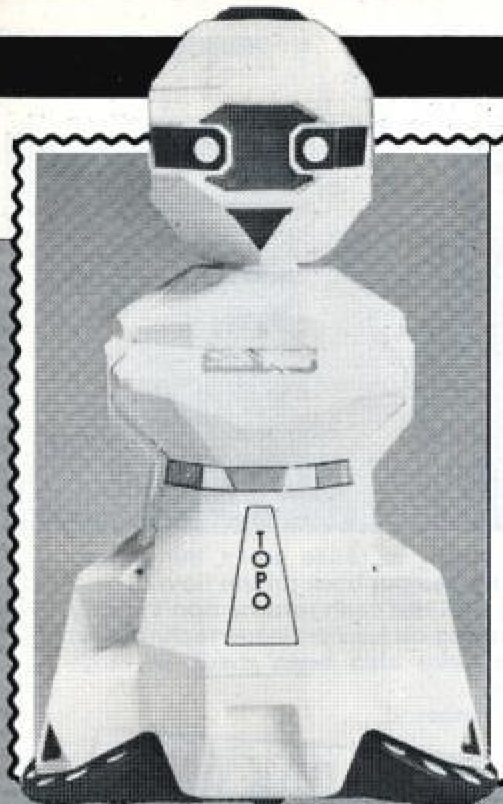
David Agulnik, the Apocalypse director who doesn't program at all — "because I'm lousy at it" — revealed how the Software Studio approach and language called ALANG has brought "the movies to your micro.

"In **Dreadnought Disaster**, the Earth has been destroyed by nuclear war, and a few people have survived thanks to being in outer space at the time. Mars becomes a new habitable planet, because the polar caps there have melted. You're on a pirate ship, it crashes into an ocean liner. This liner is the **Dreadnought** and you become a fugitive on there: but you have to get off or get out of it before it sinks," he said.

But the best is yet to come. "**The Mystery of Arkham Manor** is a horror adventure set in the 1920s: it's about strange hauntings that take place there. You're a reporter, Pete Trout, a Sam Spade character but more humorous. Your job is to investigate the story, without getting caught by the ghosts and other things."

These adventures are 50:50 text and graphics, with a liberal use of colour. On every well-known machine, or in other words the top 5/6, these are classy but expensive games (going on for £10-£15). And because they're "produced" and not "written", Agulnik reckons that they appeal to "the head and the heart".

The hidden secret? Apocalypse's designers all write an adventure in the ALANG, or **A**dventure **Lang**uage, which gives Agulnik the ability to assist in the action. Hey-A!



ROBOT SEE, ROBOT DO.

TOPO IS an Androbot, and Androbots are said to be the very thing that every home needs — which is fine if you happen to have a spare £1,500 hanging around to buy TOPO. For those with a smaller pocket little brother FRED, whose main asset is the ability to hold a pen and draw pretty unamazing outlines, costs a mere £200. Like TOPO he is controlled by a computer or a joystick and also a portable infra-red controller. BOB comes at the top of the range and will have (he's still in the pipeline) a 16-bit processor built in with anything up to several megabytes of memory as well as his own operating system.

At first sight these robots might appear to be a bit of a heist, as so far there is little software for them, and other extras like attachments such as arms for holding odds and ends or devices to go upstairs are likely to cost more.

But — says Bob Denton, managing director of Androbot's U.K. distributor Prism — the lack of software means users will be able to program them to do all kinds of activities. Some software is already out for Apple computers and packages are soon expected to link Commodore 64s and Spectrums to the mechanical newcomers. In other words it's all left to the public at the moment to sort out what's what.

Anyway Prism seem convinced that it won't be long until these Androbots can usher in a new era of ***Upstairs Downstairs*** *by taking over all sorts of household duties. Big K? We're going to wait until BOB can chase hot news stories before committing ourselves.*

HARDWARE WAR HOTS UP

THE BATTLE between US and British manufacturers for the "affordable" end of the micro market — the so-called Gaming Zone — takes on a new fierceness this spring with the launch of a whole fistful of new machines, some American, some British.

The American contenders are the IBM pc Jr. (Peanut), the ColecoVision Adam system and the more powerful additions to the Atari XL range. Heading the British list are the Sinclair QL (see page 3), the all-new Elan, the Memotech MTX range, and the Oric II Atmos.

The Elan and the Memotech MTX512 both feature 64K RAM. Atmos — being essentially similar to Oric I except for the full-stroke keyboard and the widely-publicised new ROM operating system — holds to 48. Prices are comparable with the Memotech weighing in at £315 for the 64K model, the stylish, stereo-sound Elan at slightly less than £200, with the Oric Atmos now on the shelves for £170.

Considering that the advanced games facilities of the Memotech are to some extent belied by the "executive" look of the machine itself — an approach shared by Sinclair with the QL design — the laurels for style and overt innovation have to go to Elan: a built-in joystick for cursor control: sharp, aggressive lines: snappy colour-coding on the keys, and — best of all from the point of view of software writers — stereophonic sound, thereby introducing new possibilities for sound in games packages.

The American invaders are led by the IBM pc Jr., with its unique system of infra-red linkage between keyboard and CPU. CBS-Coleco are widely tipped to be the second runner (only to IBM) in overall US sales, and flagship of the range is the stand-alone Adam system. Finally, Atari are currently launching the 800XL, 64K RAM machine, with the 1450 XLD still to come.

ORIC GAINS KEYS, NEW ROM



FOLLOWING current trends towards full-size keyboards with home computers, Oric has followed suit with its 48K Atmos — which comes complete with a snazzy new keyboard of course — that is selling for £170.

The red and black Atmos update the Oric 1 which sold over 160K during 1983.

Its main features are an enhanced ROM operating system (traditional Oric programs will still run on it though) and the Hitachi 320K three inch disc drives, which should cost around £250 for the drives, disc operating system and power supply.

Oric has fortunately remembered however that some users will prefer to stick with cassettes and has worked on improving the cassette loading. The Oric four-colour printer has also been updated as far as its plastic case is concerned to tie in with the aggressive image of the Atmos, and Oric stresses the Atmos's manual is now really simple and easy to use as it has been published through Pan.

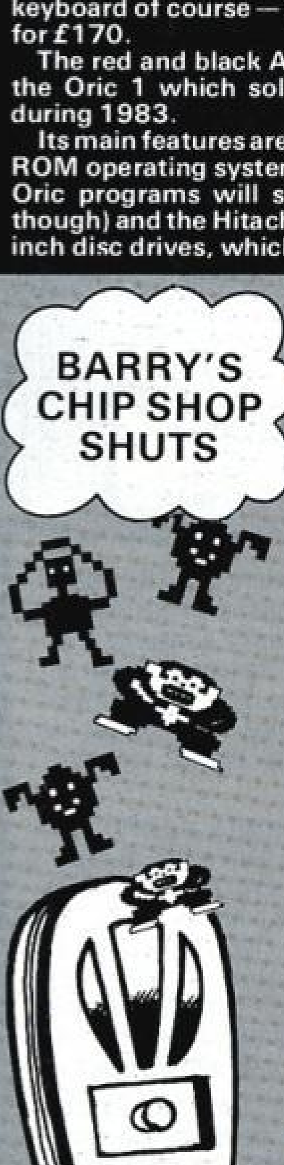
GARBAGE IN, GARBAGE OUT

DESPITE glee and happiness from Oric over the success of the Oric-1 upgrade, Our Man With The Misty Contact Lenses and the Solder Stains On His T-Shirt swears blind that, contrary to impression, existing (Oric-1) m/c programs will — with very few exceptions — NOT RUN on the Atmos. Oric, however, have no Atmos fear (ouch), since as they point out, progs in Oric Basic will run and run . . .

A New And Dreadful World Department: *Melbourne House* are so thrilled (it says here) with the theme music that accompanies *Terror-Daktil 4D* that (gulpo) the swine are considering (no, I can't go on) releasing it AS A SINGLE! Could this possibly catch on? Do we want it to? Will *Elan* owners be sniffy because their stuff will be in stereo? Will *Spectrum* owners now be able to hear their machines' alleged sound? Will the centre of the business move to LA? Will *Rod Stewart* record "The Best of the Atari VCS?"

BARRY'S CHIP SHOP SHUTS





THE CHIP SHOP, BBC Radio 4's first dose of micro fever, comes to the end of its ten-week run on Saturday, March 17.

Auntie Beeb's venture into the white heat of technology seems to have been a resounding success. A combination of popular TV presenter Barry Norman, a lively style, the current massive interest in computing and the promise of free software (more of which later) have scored a reaction that has amazed even the programme's producer, Trevor Taylor.

"Overwhelming," he said when quizzed by Big K about reaction to the series. "The phone keeps ringing all day." Before the first Chip Shop even hit the air-waves over 12,000 calls had been received at Broadcasting House. After the second programme had gone out the phone continued to ring and the mail room began to be flooded out with over 40,000 enquiries, mainly about the show's unique "takeaway" service — a method of downloading software off-air.

Using a system called Basicode 2 developed by the Dutch broadcasting system NOS, The Chip Shop was able to broadcast programs that could be understood by several different makes of microcomputer. "It's a kind of computer 'Esperanto'," explained Trevor Taylor.

However, the promise of "free software" becomes a bit hollow when you're told that, to get the off-air programs into your micro a special Basicode 2 interpreter cassette, price £3.95 (including post and packing), had to be sent for. Initially a dozen machines were catered for with a final total of around 20 micros on the system.

The last programme in the series, a live special from "Silicon Valley" in California, is sure to start speculation as to when, or if, there will be a second series. Trevor remained non-committal on that point. "It's being considered," was all he'd say.

Throw away your manual: *MasterClass* (the video people) have released a series of hour-long cassettes which unravel the ins and outs of graphics and games for the BBC and its li'l sister, the Electron. Tapes include three games on the audio track, which can be down-loaded to a computer via a cassette recorder . . . Yes, there's a lot of this self-help about: Melbourne House have now added to the Overall Games Designer Package Situation. We already have *Scope, Fifth* and *The Quill* — to name but a few — now we have *Draw* (Spectrum) and *Hurg* (ditto, but games-orientated). Who'll be first with a piece of software that helps you write software to write software to . . . stop it.

Finally, a serious note: E Flat.

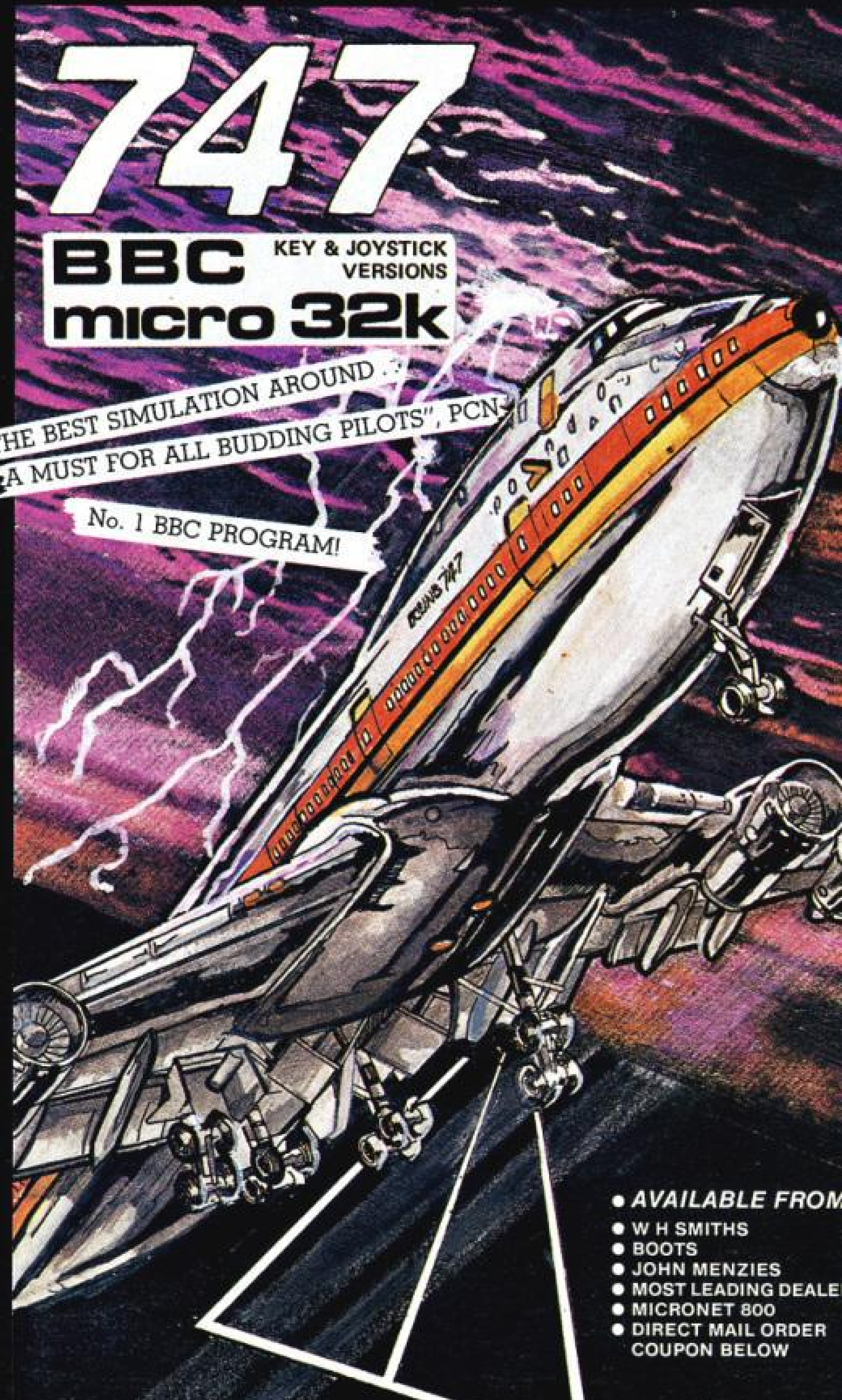

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WE WELCOME HIGH QUALITY PROGRAM SUBMISSIONS AND PAY TOP ROYALITY RATES

In the dim, dark, dreaded days of Recessionsville, successful games programming has become one of those legendary occupations — like rock 'n' roll or football — by which the young and stony can transmogrify themselves into the still-young and disgustingly wealthy. But is this vibrant myth true? Are there still openings for teenage computer geniuses? And how much do they really earn?

PAUL WALTON ran five of the biggest star-names to earth in an attempt to find out.

DO YOU SINCERELY WANT TO BE RICH?

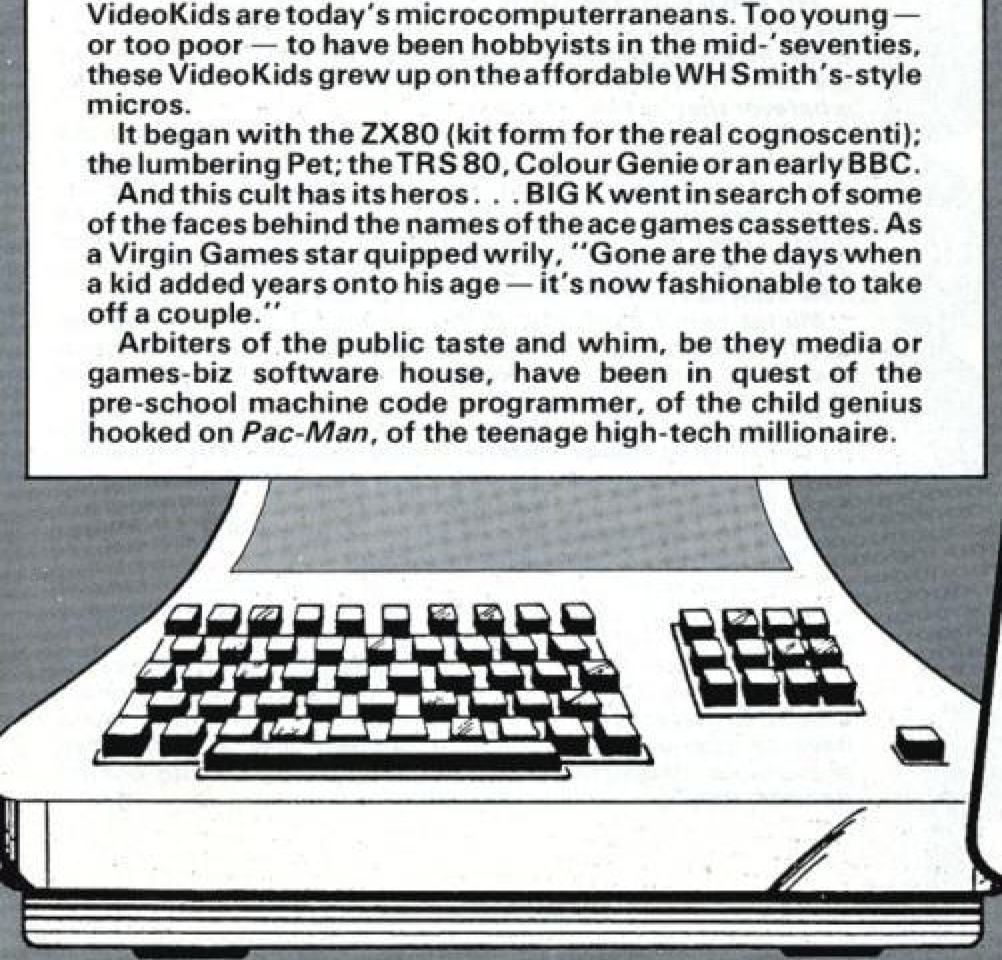


VideoKids are today's microcomputerraneans. Too young — or too poor — to have been hobbyists in the mid-'seventies, these VideoKids grew up on the affordable WH Smith's-style micros.

It began with the ZX80 (kit form for the real cognoscenti); the lumbering Pet; the TRS 80, Colour Genie or an early BBC.

And this cult has its heros . . . BIG K went in search of some of the faces behind the names of the ace games cassettes. As a Virgin Games star quipped wrily, "Gone are the days when a kid added years onto his age — it's now fashionable to take off a couple."

Arbiters of the public taste and whim, be they media or games-biz software house, have been in quest of the pre-school machine code programmer, of the child genius hooked on *Pac-Man*, of the teenage high-tech millionaire.



SEVENTEEN-YEAR-OLD MATTHEW SMITH has just quit Liverpool's BugByte to found his own independent label with a couple of other known-names — as Software Projects. A relatively new VideoStar, it was Smith who brought the US videogame *Miner '49er* to the Spectrum *et al* with his related, *Manic Miner* just over a year ago.

He's now haggling with BugByte for payment of substantial royalties (around £16,000) on the 40,000 copies of *Manic Miner* they still hold in stock. Matthew's already made that much again from his 5 per cent cut on the first 40,000 copies.

"It's a popular misconception that I worked for BugByte and was then lured away. I never did — all they ever did was to manufacture and sell my game for me," said a now older and wiser Matthew Smith. He left BugByte together with one of the founders, Alan Maton. He took *Manic Miner* with him "as a way of getting Software Projects off the ground."

Matthew began playing games on a cheapo-cheapo Tandy TRS 80 model 1. While still 16 he produced his first game, called *Styx*, but added that it was "quite a flop" for BugByte. "But that didn't put me off. I just got down to writing *Manic Miner* that summer (1982). I realise that *Styx* was so bad because I had been writing it on the Spectrum, rather than using the TRS 80 for design and then targetting back to the Spectrum.

"It's become a lot easier to write the game which I'm now working on, *Jet Set Willy*. Since I fixed a hardware fault on the TRS 80 model 4 which I now use," he added. *Jet Set Willy* is a classic shoot 'em'up speed-freak's game.

And what of fame and fortune? Well, Matthew is well known in the designer world but hasn't yet got the VideoStar status he deserves. But will admit to "tens of thousands of pounds" in royalties for eighteen month's work.

This is "the reward of being able to stay freelance", said Matthew, and he added that to save the hassle of starting a company and still get more than a couple of per cent, even he might do things differently.

"If I were starting again and had a good game, I'd offer it around several software houses before accepting the first offer that comes along," said a slightly bitter Matthew. For every pound which he gets from *Manic Miner*, BugByte rake in the other £19 . . . that's £76,000 worth of sales.

And the moral of this story? "Stay freelance, very definitely!"

Continued on next page



A FLOWER SOON TO FADE?

And then there is seventeen-year-old EUGENE EVANS, *the* VideoStar that everybody's heard of — in fact Imagine's ace designer is getting a bit sick of the publicity. "I try to ignore the cynical comments, like 'why should *you* be earning so much at *your* ages', and all the sarcasm that seems to appear in the press."

Imagine, easily the country's biggest games house, have stopped putting the designer's name on their ads or on their cassettes. Now home of what might be termed the New Merseybeat, "it's like an ongoing soap opera" to Eugene. "Everybody moving from one company to the next as easily as pop stars move record labels."

By virtue of the fact that he was the tea-boy at one of the first Liverpool "microcomputeranea" firms, MicroDigital (to high-tech and VideoStars what the Cavern was to the Merseybeat and the Beatles), "I learned to use every machine going — I just sat down and used them all."

Eugene is now at what you might call "the serious end" of the games business: "Imagine is going to be around a lot longer than I am, after I've gone off writing games and moved on to something else." The dawn of a new era, rather than a new fad, can be found with businesses like Imagine, with loose associations, or independent outlets (or "indies") like Software Projects, or with production studios like adventure aces Apocalypse Software of Oxford.

"Each of the 100-plus people at Imagine is a specialist in some part of computer games design," said Eugene. "For instance, we've just put out *Alchemist* on the Spectrum with music produced by our own in-house band.

"The point is that we don't think that you can expect to do everything yourself! And that applies to the artwork, the ideas and the animation."

And what about the £40,000 plus which Eugene Evans took home in 1983? "I'm only getting what I'm producing. I couldn't get that anywhere else. More and more games designers will be getting a share of the whole thing, not the lump sum royalty. It'll become more like A Job."

A Job — Good Grief!

And who will the employers be, in Eugene's vision of the future? Big business, like Virgin Games or Imagine Inc.? Not necessarily. There are ways of working together and still staying independant, but perhaps the archetypal VideoStar might fade after a brief shot at the bigtime.

THERE'S MONEY IN MUTANTS

Twenty-two year old JEFF MINTER, the man behind the Llama(Soft) and the **Mutant Camel** *doesn't mind the long hours poring over a keyboard — in fact he's just had his own "computalab" built over the garage to house all the hardware which financial success has brought.*

Jeff could well claim to be the county's VideoStar. Not one of his impressive half dozen games has ever missed. People buy from the Llamasoft company which he runs (with his mum) "in the same way that some people just buy Pink Floyd albums, whatever they're like," he said.

*Jeff is a unique designer in lots of ways. After a brush with the school's Pet (***201** *— for those who can remember it), he's concentrated on producing games on the target machine for which they were intended (ZX80/81, VIC or 64 usually), and he doesn't use a larger machine to cross-compile games back down across a whole range. It is common knowledge that some firms now even use mainframe computers to design micro games.*

Minter won't have any of this: "I take it slowly, using the qualities of the target machine to the best advantage to keep up the quality of the game," with the only exception being the use of the superior VIC screen editor to write Commodore 64 games.

The result has been a stream of hits, starting with **Loadrunner**; *its sequel* **Gridrunner**; **Matrix**; *a new idea in* **Hovver Bovver**; *and the deservedly renowned* **Attack of** *(and the* **Revenge** *of) those* **Mutant Camels**. *Having Llamsoft — which contracts out copying and distributing the cassettes — means that Jeff Minter and his mum get to keep most of the loot.*

Is he a rich man? "Well I'm not telling you how rich — but I'm very comfortably off!" said Jeff. "My last game, **Revenge**, *has just topped the 10,000 sales mark, so work it out."*

Just like Matthew Smith, Jeff Minter reckons that there's a lot gained by being a VideoStar "and I'm no different a person today, despite all that money". His advice to new designers is that, if you have to sign-up, "Get them to promote you — don't stay anonymous. People will follow you, the games you write, not the games house."

THE LONELINESS OF THE LONG-DISTANCE PROGRAMMER



Twenty-four-year-old STEVE LEE didn't have the time to hold-out for a bigger slice of the cake. After eventually turning in his first games hit at the ripe-old age of 22, the then computer operator found himself on the dole.

"Last spring I found out that I wasn't going to become a programmer [of larger minicomputers], when I was made redundant from a bank. I didn't have the time to wait for my games royalties to come in, so after seeing their ads I went along to Virgin Games," said Steve.

Steve is now Virgin's "major unit earner", as they call him, or a VideoStar, grossing more with the Commodore 64 wham-bam game *Falcon Patrol* "than all the rest of the list put together", he proudly adds. "Yes, very pleasing that one."

But it wasn't easy. His first game, *Mission Mercury* was a flop — because it came out for the unexpanded (memorywise) VIC-20 just weeks before Commodore cut the price of memory expansion.

And he almost didn't make it this far. "If I hadn't have signed for Virgin, I wouldn't still be writing games today. I'd be trying to be a 'real' computer programmer," he said with more than a hint of irony.

Steve is one of the original ZX81-for-Xmas crew (in 1981 to be precise), but he soon moved up to the newly-released VIC-20. Being a programmer by training, Steve soon knocked out his first game on the VIC — "it was called *Tornado*, a copy of *Scramble* really".

And then? . . . "But I didn't do anything with it for the first six or seven months. Since I didn't play a lot of games myself I sort of assumed that the commercial stuff was better. Which on the whole it wasn't!"

Steve Lee took *Tornado* to London-based Quicksilva last January. It sold well enough "to pay expenses," he said. Nothing special. But the follow-up, *Sky Hawk* (also on VIC) "really took off". But even his (fair) royalty on gross sales of 12,000 — 14,000, and an up-front advance, weren't enough to see Steve through 1983.

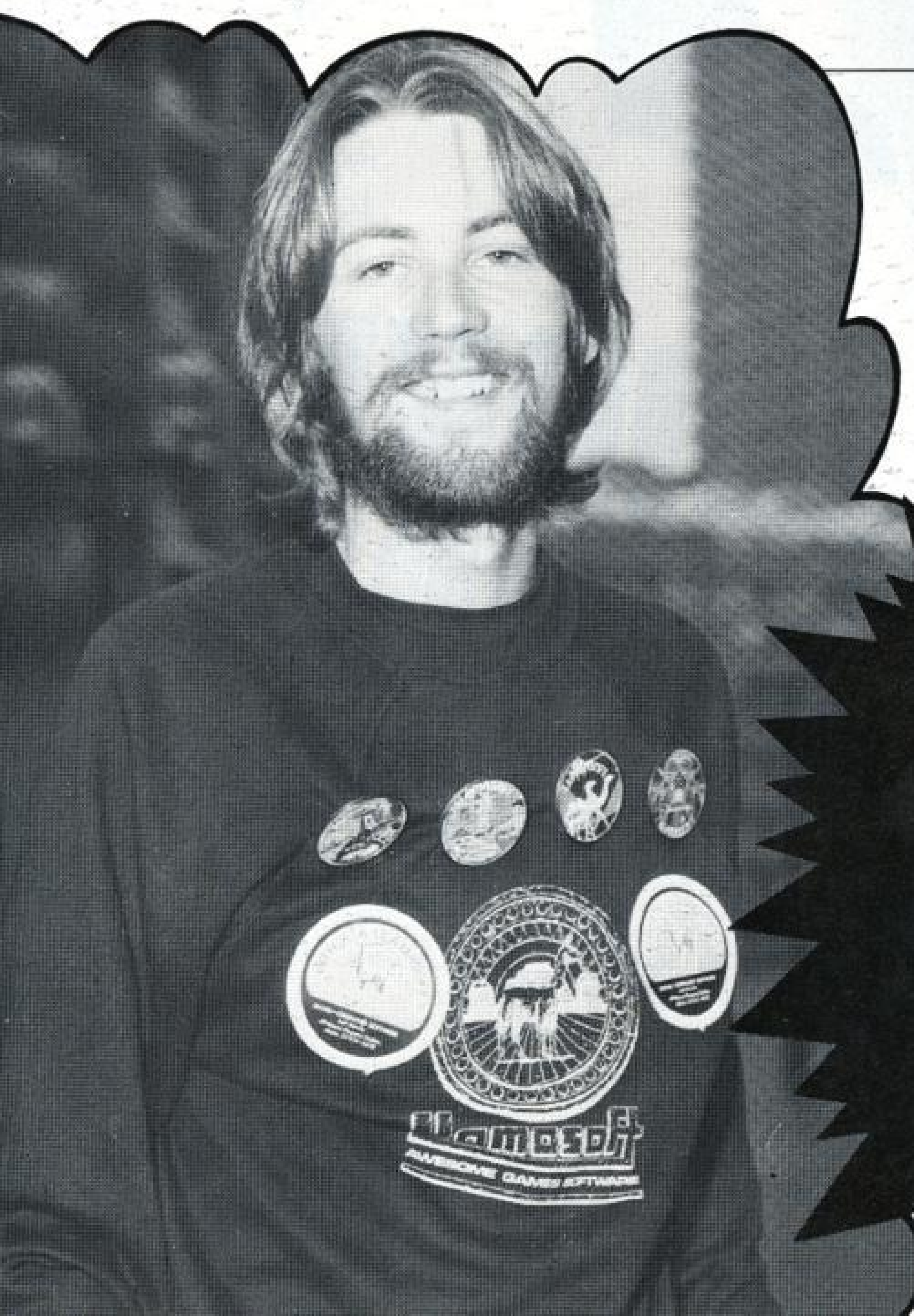
He, and several other VideoStars, went to Virgin Games on pretty rigid exclusive contracts because, as Steve comments "they were the only ones at that time who could offer you a reasonable living guaranteed".

Nobody will discuss Virgin's deal, except to say that it's "like a weekly wage with a small royalty twice a year — like Christmas and birthday presents".

But, to be fair, Steve reckons that Virgins are "as good as any other firm to deal with the business end" — copying tapes, selling them through shops or mail order — "and probably better when it comes to working out ideas".

Steve Lee will stay with Virgin — "although I don't think I'm going to get rich, become a millionaire, say, not here." He is now working on a new game, *Hideous Bill and the Gigans*, which is a refreshing departure for him, being "more adventure than shoot 'em' up". And there will be a sequel to *Falcon Patrol*, taking the orignal idea a bit further and "adding in some of the ideas which got cut last time around".

As we left him, Steve was rather reluctantly returning to his C64 keyboard. The isolation of the job does depress him: "All in a fourteen-hour-day's work!"



Twenty-two year old DAVID AGULNIK, chief of Apocalypse Software, was anxious to point out that he "doesn't program — I'm lousy at it!" And yet he is a VideoStar of sorts . . . a computer games producer/director, doing what Malcom MacLaren did for Punk.

"This won't be a star-orientated business in the future — it will be more like the film or record industry, with groups of specialists working together in groups. A game will be directed, not written by one person," Dave told us. Apocalypse is about to release a couple of games for the top five or six machines — *Dreadnought Disaster* and the *Mystery of Arkham Manor*, both written in a patent Adventure Language (ALANG).

```
PROGRAM:  ROCKET
2 REM"[DEL6]
5 REM ROCKET COMMAND ADAPTED FOR VIC
   BY G. HOAREWELL
10 VI=9*16^3:OF=38400-7680
   :PRINT"[CLEAR]"
1[illegible] FOR A=38400+22 TO 38400+22*23
   :POKE A,0:NEXT
15 C=7680+22*20+15
20 POKE VI+15,6+128+64+32+8
21 GOTO 30
25 AA=0:IF PEEK(37151)=30 OR PEEK(371
   51)=26 THEN AA=1
26 RETURN
30 PRINT"[HOME,RED]*** ROCKET COMMAND
    ***";
31 PRINT"[WHITE]GUIDE MISSLE WITH
   JOYSTICK. BUTTON FIRES"
40 PRINT"[HOME,DOWN15,BLACK]▚[LEFT,
   DOWN]▚[LEFT,DOWN]▚[LEFT,DOWN]▚
   [LEFT,DOWN]▚[LEFT,DOWN]▚[LEFT,DOWN]
   ▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚";
50 PRINT"[UP,LEFT13]^^^^^^^^^^^^^^^"
60 A=7680+22*22+15
70 GOSUB 25:IF(AA<>0)AND(B=0)THEN B=1
   :POKE C+22,32:D=C:C=C-1:K=1
   :POKE 9*16^3+13,128+125:L=16
71 IF K=1 THEN L=L-1:POKE 9*16^3+14,L
72 IF L=0 THEN K=0:POKE 9*16^3+13,0
75 IF C=8121 THEN PRINT"[HOME,DOWN7]
   NO MORE ROCKETS!!!"
   :POKE 9*16^3+14,0:FOR AA=1 TO 3000
   :NEXT:RUN
80 IF B=0 THEN 110
85 POKE D,32:D=D-22
86 POKE 37154,127:PJ=PEEK(37151)
   :IF PJ=110 OR PJ=46 THEN D=D-1
87 IF PEEK(37152)=119 THEN D=D+1
88 POKE 37154,255
90 IF PEEK(D)=60 OR PEEK(D)=62 THEN G
   OSUB 500:GOTO 70
100 IF D<7680+88 THEN B=0:GOTO 110
105 POKE D,30
110 IF H=0 THEN 200
115 IF H=0 THEN 70
120 POKE F,32:F=F+E
125 IF F=I THEN H=0:GOTO 70
130 IF PEEK(F)=30 THEN GOSUB 500
   :GOTO 70
140 POKE F,G:GOTO 70
200 H=1
205 IF INT(RND(1)*2)=1 THEN E=-1
   :F=7702+(INT(RND(1)*10)+6)*22
   :I=F-22:G=60:GOTO 115
210 E=1:F=7680+(INT(RND(1)*10)+6)*22
   :G=62:I=F+22:GOTO 115
500 B=0:H=0
501 SC=SC+10:PRINT"[HOME,DOWN3,BLACK]
   SCORE = "SC
502 POKE F+OF,4:POKE F+1+OF,4
   :POKE F-1+OF,4
503 POKE F+OF+22,4:POKE F+OF-22,4
510 POKE F,160:POKE F+1,160
   :POKE F-1,160:POKE F+22,160
   :POKE F-22,160
521 POKE 9*16^3+13,128+35
522 FOR Y=16 TO 0 STEP-1
523 POKE 9*16^3+14,Y
524 FOR P=1 TO 80:NEXT:NEXT
530 POKE F,32:POKE F+1,32:POKE F-1,32
   :POKE F+22,32:POKE F-22,32
533 POKE 9*16^3+13,0
540 FOR GH=F TO F+22*16 STEP 22
544 II=PEEK(GH):POKE GH,G
   :FOR OO=1 TO 60:NEXT
546 POKE GH,II:NEXT
800 RETURN
```



by G. Hoarewell
for VIC 20

ROCKET!

"This is NASA. At this time we have an ongoing lift-off situation. Wait! Oh my Gahd! We've just heard that the inbuilt flight computer has gone on the blink! This means that Major Al Hoolahan — that's his name, right, Barbara? — has gotta fly that bird all on his ownsome or head pronto for the Big Splashdown in the Sky. This is ABC news, folks, the channel that brings you the disasters as they actually happen. And now a word from our sponsor . . ."

You're on your own, Al.

BIG K charts

key

SP = Spectrum, AC = Acorn, 64 = Commodore 64, V20 = Vic 20, 81 = ZX 81, DR = Dragon 32, OR = Oric-1

TOP 30 GAMES (Retail)

				SP	AC	64	V20	81	DR	OR	Price
1	(1)	ATIC ATAC	Ultimate	★							£5.50
2	(2)	LUNAR JETMAN	Ultimate	★							£5.50
3	(5)	PYRAMID	Fantasy	★							£5.50
4	(6)	ANT ATTACK	Quicksilva	★							£6.95
5	(17)	SNOOKER	Visions	★	★	★	★				£8.95
6	(3)	VALHALLA	Legend	★							£14.95
7	(12)	KONG	Ocean	★							£5.90
8	(4)	CHEQUERED FLAG	Psion	★							£6.95
9	(7)	SPLAT!	Incentive	★							£5.50
10	(10)	THE HOBBIT	Melbourne	★	★	★				★	£14.95
11	(21)	MANIC MINER	Bugbyte	★							£5.95
12	(30)	DEATH CHASE	Micromega	★							£6.95
13	(14)	MR WIMPY	Ocean	★							£6.90
14	(—)	THE ALCHEMIST	Imagine	★							£5.50
15	(—)	HUNCHBACK	Ocean	★		★					£6.90
16	(8)	FLIGHT SIMULATION	Psion	★							£7.95
17	(—)	POOL	CDS	★							£6.95
18	(13)	ARCADIA	Imagine	★		★	★				£5.50
19	(24)	PENETRATOR	Melbourne	★							£6.95
20	(11)	HUNTER KILLER	Protek	★							£7.05
21	(—)	JET PAK	Ultimate	★			★				£5.50
22	(15)	FALCON PATROL	Virgin			★					£7.00
23	(9)	METAGALACTIC LLAMAS	Llamasoft				★				£6.00
24	(—)	3D TIME TREK	Anirog			★	★				£7.00
25	(18)	MOONBUGGY	Anirog			★					£7.00
26	(—)	CRAZY KONG	Interceptor			★	★				£7.00
27	(16)	HORACE AND THE SPIDERS	Psion/Melbourne	★							£6.95
28	(—)	INTERNATIONAL FOOTBALL	Commodore			★					£9.99
29	(8)	HOVVER BOVVER	Llamasoft			★					£7.50
30	(—)	CHINA MINER	Interceptor			★					£7.00

Compiled by MRIB Computer.

VIDEO GAMES (Dedicated Consoles)

1 POLE POSITION (Atari)
2 Q-BERT (Parker)
3 FATHOM (Imagic)
4 BATTLE ZONE (Atari)
5 GALAXIAN (Atari)
6 TUTANKHAM (Parker)
7 RIVER RAID (Activision)
8 DECATHLON (Activision)
9 JUNGLE HUNT (Atari)
10 SORCERER'S APPRENTICE (Atari)
11 ENDURO (Activision)
12 ROBOT TANK (Activision)
13 DIG DUG (Atari)
14 PHOENIX (Atari)
15 PLAGUE ATTACK (Activision)
16 PITFALL (Activision)
17 CENTIPEDE (Atari)
18 KANGAROO (Atari)
19 MOUSETRAP (CBS/Coleco)
21 WIZARD OF WOR (CBS/Coleco)
21 FROGGER (Parker)
22 PAC MAN (Atari)
23 DONKEY KONG (CBS/Coleco)
24 MS PAC MAN (Atari)
25 STAR WARS: JEDI ARENA (Parker)
26 VANGUARD (Atari)
27 SPACE INVADERS (Atari)
28 OINK (Activision)
29 SEA QUEST (Activision)
30 SOLAR STORM (Imagic)

Compiled by MRIB Computer.

also selling well in mail order...

(Not based on sales figures and in alphabetical order)

ANT ATTACK (Quicksilva)
ATIC ATAC (Ultimate)
ATTACK OF THE MUTANT CAMELS (Llamasoft)
AIRSTRIKE II (English Software)
BUGABOO (Quicksilva)
CONFRONTATION (Lothlorien)
FOOTBALL MANAGER (Addictive)
GRAND MASTER (Audiogenic)
JOHNNY REB (Lothlorien)
LOST IN SPACE (Salamander)
LUNAR JETMAN (Ulitimate)
MICROBOT (Softek)
MOTOR MANIA (Audiogenic)
1984 (Incentive)
PILOT 64 (Abbex)
POOL (CDS)
REVENGE OF THE MUTANT CAMELS (Llamasoft)
737 FLIGHT SIMULATOR (Salamander)
SNAPPER (Acornsoft)
SNOOKER (Visions)
SPACE SHUTTLE (Microdeal)
SPLAT! (Incentive)
UGH! (Softek)

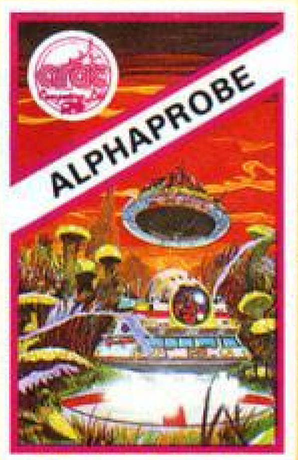
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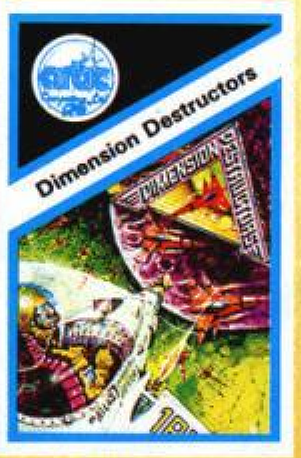
COSMIC DEBRIS

Asteroids, plummetting through the galaxy, miss your spaceship by millimetres! Clean up or get blasted! And look out for unidentified alien nasties coming at you from nowhere!
48K Spectrum **£4.95**
ORIC 1 48K **£5.95**



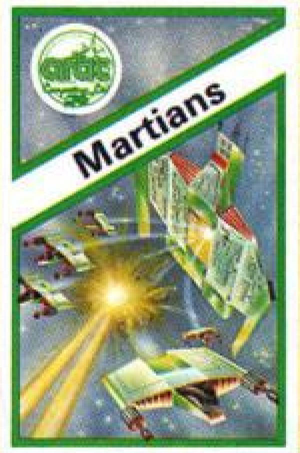
ALPHA-PROBE

Explore strange new planets, practice delicate landing manoeuvres. Collect desperately needed fuel or abandon your fateful mission.
16K ZX81 **£3.95**
16K/48K Spectrum **£4.95**



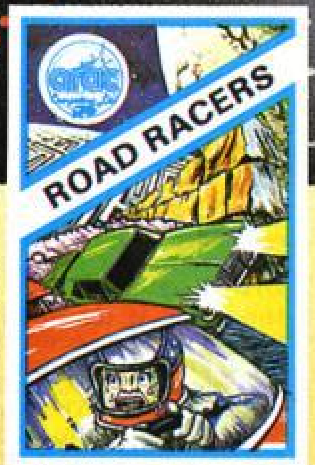
DIMENSION DESTRUCTORS

An armada of 3 dimensional Star Destroyers hurtle across your screen to destroy you. Swerve and fire to survive their attempts to blast you from the skys. Only the most skilled pilot will learn the terrible secret of this assault. The ultimate 3-D space war game.
Spectrum 48K ZX **£5.95**



MARTIANS

Wave upon wave of Martian attack ships threaten your survival. Only your inter-galactic marksmanship can save you. You must hit the nuclear power-packs at the heart of the Martian ships before they overrun the Universe.
VIC-20 **£5.95**



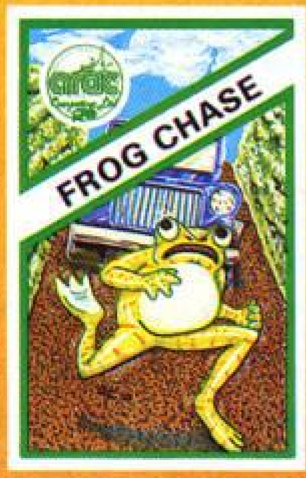
ROAD RACERS

You are speeding over an unknown race track, passing checkpoint flags to pick up valuable points. But watch out! There are other cars on the track and your fuel is running low!
16K/48K Spectrum **£4.95**



SNAKE

Among the flies and bugs your pet snake hungrily devours are a crop of poisonous mushrooms. Can you stop him eating them before it's too late? Mind he doesn't do himself in with his venomous bite!
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VIC-20 **£5.95**



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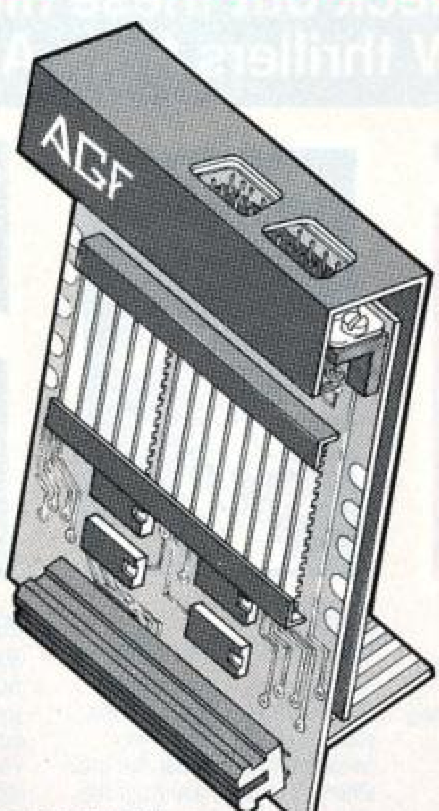
Programming is achieved by a two-digit code, which is looked up on the Programming Chart supplied, for each direction and firing button. These two numbers are then selected on a pair of leads which are clipped onto appropriately numbered strips on the interface.

Once configured this can be marked onto a Quick Reference Programming Card for storing with the game. As the programming is *not* power dependent the interface can be immediately used when next switched on.

The keyboard remains fully functional and can be used simultaneously with the joystick.

An integral rear expansion connector means there is no need to remove the interface to connect other peripherals.

NB. A recent design improvement now means that the AGF Programmable Interface works with the new Quickshot II rapid "Auto Fire" feature.

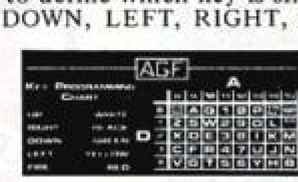


KEY FEATURES

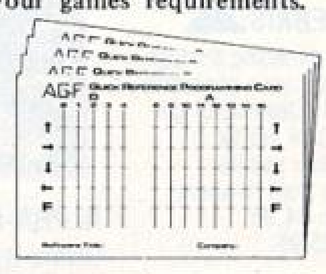
- ★ Programmable design gives TOTAL software support.
- ★ Accepts Atari, Competition Pro, Wico, Starfighter, Quick Shot, Le Stick etc.
- ★ Rear extension connector for all other add-ons.
- ★ Free demo program and instructions.

PACKAGE CONTENTS SUPPLIED

- Programmable Interface Module as illustrated, complete with clip-on programming leads.
- Self adhesive programming chart detailing how to define which key is simulated by UP, DOWN, LEFT, RIGHT, and FIRE.



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WONDERFUL WIDGETS

Some call them Peripherals (though not with their mouths full). Necessary bits — or just so much junk? BIG K takes a wander down Bolt-On Boulevard and gives a few new products the once-over . . .



FINGER LICKIN' GOOD

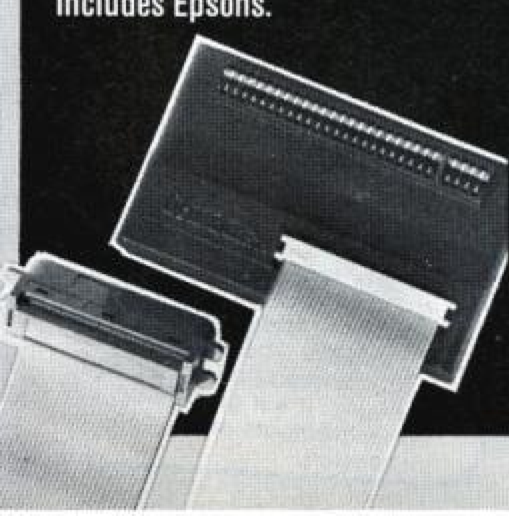


An end to Arcade Thumb and Video Wrist and other exotic computer-related ailments may at last be in sight — thanks to a new breed of hand controller. The Suncom Joy-Sensor (left), which retails at £29.95, offers a genuinely new way of avoiding fatigue while enjoying super-swift response to your input.

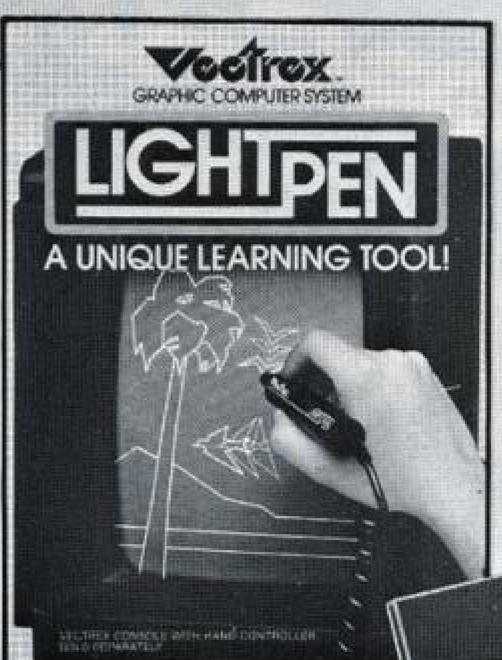
The lightest touch with the ball of the thumb on the tough circular pad beneath accurately signals movement info. Choice of FIRE or RAPID touch-pads allows instant zapping in one mode and non-stop blasting in the other — ideal for games like Defender. The case is tough plastic airbrushed silver and looks likely to stand up to severe use — as likely as any conventional stick we've seen, anyway. The Suncom range is designed and made in the USA and not unnaturally favours Apple, Atari, Commodore and Coleco linkage. Assuming your style is very much shoot-'em-up, and you've got the best part of thirty notes to spare, you could make worse moves. Even better — there's no moving parts to wear out (we think), so if megalongevity (good word?) is your aim, again, you could do worse. There's a final classy touch: a single slider switch amidships converts the FIRE/RAPID touchpad to left-handers' and right-handers' preference.

Communication Boost

One of the remaining beefs with the Sinclair Spectrum is the electrostatic ZX printer, the only model of printer which will talk to Spectra. Now all that has changed, thanks to those pioneering types at Kempston (home of the Spectrum Joystick). Their special Printer Interface (illustrated, left) allows you to hook up your Spec to most printers that will accept serial input — this includes Epsons.



Plug in the gubbins, tap in a piece of supplied software (two lines of machine code), load or write your prog . ... and hey presto! It doesn't work. Well, ours didn't, and we've heard some similar tales from other sources. "Must be the code not getting into the buffer", said an Old Kempstonian when taxed with this one. Must be. The replacement software sent with commendable promptness also failed to activate the gizmo but to be strictly fair we're beginning to hear about ones that work as advertised. No doubt it'll all come right before long. At more than fifty quid it should, shouldn't it? And the benefits (banish that shiny-paper look) are incalculable.





VECTOR VICTOR

Light pens are a source of hair-raising wonder even to those who've seen them before. Vectrex's model, for use with their unique vector-graphics videogame system, provides a good intro to the world of on-line screen graphics. Using the pen, which plugs into a controller port, and the supplied *Art Master* ROM cart, Vectrex owners can choose from a menu of three options to sketch, connect (plotted dots), or animate up to nine separate frame sketches.

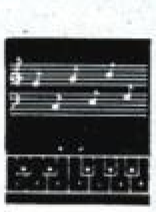
The pen itself is small, neat and fault-free; everything works as it should. The only drawback is the inability to save your finished work in any shape or form.

Vectrex say they're working on it.

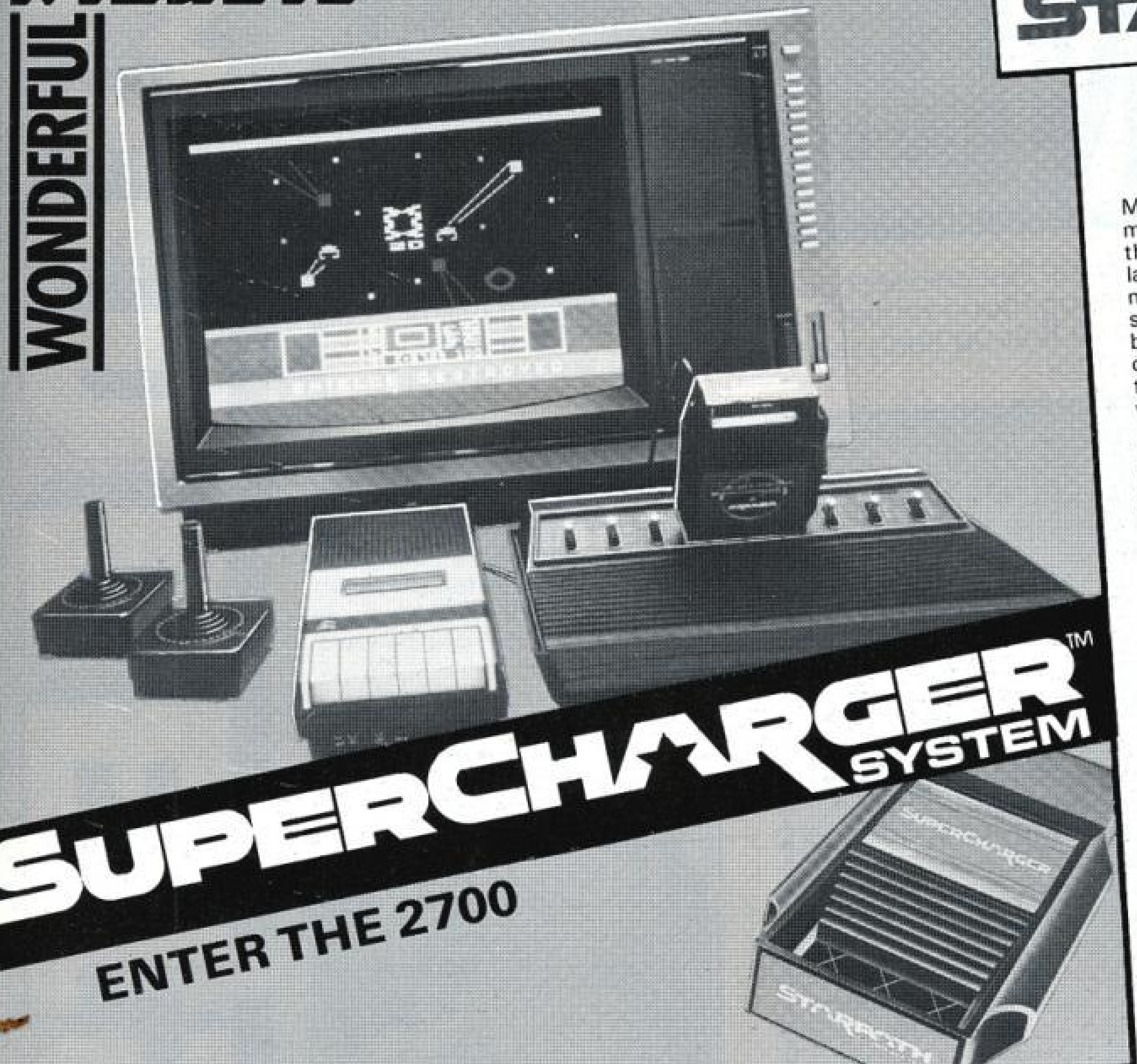
In the meantime if you already own another computer this product won't help; but if you've got hold of a Vectrex, then the Light Pen provides a useful bolt-on — especially as Vectrex have now announced plans to upgrade the system to full computer status with a bone-fide keyboard plus a barrelful of RAM.

From game system to standalone vector graphics machine, the odd-man-out Vectrex suddenly looks to have a lot more credibility than some had thought. Especially as it has its own screen.





WONDERFUL **WIDGETS**



SUPERCHARGER™ SYSTEM

ENTER THE 2700

by Steve Keaton

THE HUMBLE Atari VCS. You can find them in thousands of homes across the country. Some remain avidly used but many now sit neglected, having become little more than an affectionately-remembered relic from gameplaying days gone by.

However an astonishing new add-on has arrived that could well prove the salvation of the trusty 2600. It's called the Starpath Supercharger and it quite literally transforms your VCS into a state-of-the-art games machine.

The 'charger is in fact a large capacity storage device which plugs into the Atari like an overly plump ROM cartridge. Games stored on standard audio cassette can then be loaded directly into it in the usual micro manner via an attached cable jack. The system is simplicity itself but the results are astonishing.

The 'charger expands the onboard RAM of the VCS almost fifty fold, from 128 to 6272 bytes! This extra memory considerably extends its graphic capabilities. Price? £19.95, *less* than a standard cart.

Included with the Supercharger is a free game, **Phasor Patrol** — a sort of **Star Raiders** variant in which you scud through the galaxy routing out dastardly Dracons. All you need to get yourself spaceborne is a domestic cassette recorder (or personal hi-fi). Having found one simply insert the Supercharger into the cartridge slot of the VCS (insuring that the power is OFF of course) as you would a normal game and plug the attached cable jack into the EAR socket of your cassette player.

To show that it is ready to take a game the Atari will then cause the message 'REWIND TAPE—PRESS PLAY' to flash upon the screen. Now just bung the game cassette into the player and hit the required button. Those expecting the loading time of a Spectrum epic will be pleasantly surprised. The games load in under 30 seconds.

An impressive collection of Starpath Supercharger tapes is already available, and there's more waiting in the wings. The quality is almost comparable with the ColecoVision games system and many boast multi-load capability. This is a feature unique to the Supercharger which enables you to play not so much variations on a theme, eg. fast invaders, slow invaders, invisible invaders, as a series of entirely different games. Complete stage one and the VCS will ask you to load in stage two. Each load adds new screens, characters and levels of difficulty. Scores from successive games are then incremented to provide one final overall total. It's a neat idea. The games retail for £9.95.

BEST OF THE STARPATH CORPORATION GAMES

RABBIT TRANSIT

Mammoth quotas of cuteness mark this multi-screen romp through *Watership Down* land. In it you assume the mantle of guardian angel to a small white rabbit — the idea being to help it negotiate meadows and ledges in a quest for the fabled Bunny Bushes of yore.

Screen one finds you in the Mysterious Meadow. Here you must hop your furry pal down to the river bank and onto a friendly turtle's back. As you might imagine though a variety of nasties, including butterflies, bees and chattering teeth will all try and stop you. Needless to say traversing the meadow becomes increasingly difficult.

Having made the relative safety of the turtle you'll be whisked away to the Land of Ledges. Now you must leap from ledge to ledge thereby converting their colour. However as you bounce happily about a nutcase at the top of the screen is busy throwing rocks in your direction. In later screens these rocks not only pose a health hazard, but recolour the ledges you've just painted! You'll have to retrace your steps and convert the rotten things again.

The game is a delight to play. The audio visuals are terrific and the challenge level surprisingly high. Just take one visit to the Bunny Bushes and I guarantee you'll be hooked.

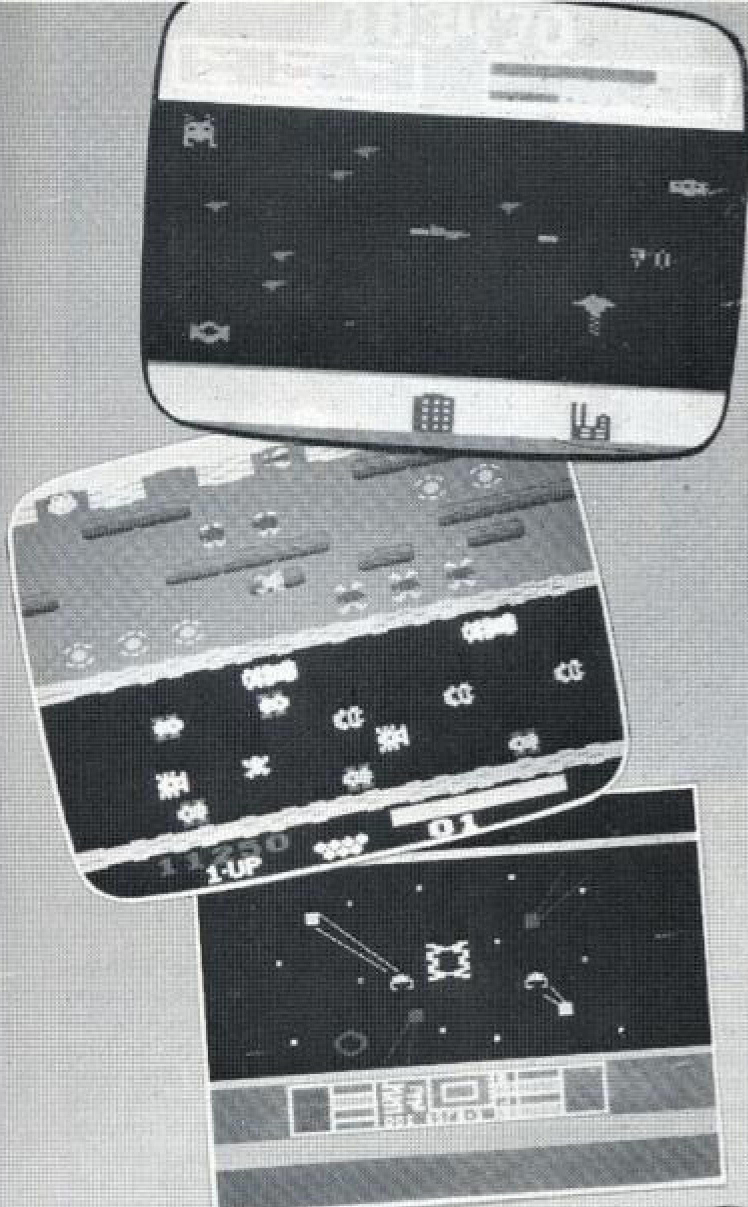
SURVIVAL ISLAND

You begin this multi-load graphic adventure shipwrecked somewhere on the high seas, with nothing more than a raft to your name. You've little choice but to begin an arduous journey towards the volcanic island which lies smoking on the horizon.

However any thoughts of a peaceful paddle are rudely interrupted. Sharks and Sea Monsters provide unwelcome company, shoals of fish help themselves to any supplies you may find and an unfriendly submarine surfaces at the worst possible times.

Should you ever make it to the island (it took me umpteen tries) you'll be asked to load phase two. This deposits you upon the shore where you'll work your way towards a secret temple. Unfortunately my life points at this stage were so severely drained that I could barely get to my feet let alone explore. Consequently I saw little of the island and nothing of Load three.

Devotees of David Crane's *Pitfall* will doubtless be hugely excited by this offering. The area of play is massive and attention to detail impressive. The explorer himself is a dead ringer for David Bellamy. It's a game with all the ingredients of a longterm obsession.





Orion's FORMAT 4 graphics kit

Map that game! At last you can plan your graphics properly — no "busting" from one supposedly mapped area into another, no incomprehensible sprites or tacky animation. With Orion Software's FORMAT 4 Spectrum graphics kit you can do all this and more. The kit? A ringbinder with matrix sheets, hex charts, overlay films etc., plus coloured pens, a blank C15 AND a calculator. All for £16.95.

FROGGER

Perhaps a curious choice for a 'best of' collection, owing to its great age, but I had to include it because it's simply the best version that I've seen outside of an arcade. The graphics are marvellously detailed. Trundling steamrollers scroll alongside formula one racers, whose little wheels spin ten to the dozen, while turtles, complete with fins, paddle happily in the river. All the features that made the original such a hit have been faithfully reproduced. It's a conversion that makes the rival VCS offering from Parker look decidedly mundane.

Gameplay is fast and colourful. Progressive difficulty levels add crocodiles, snakes and otters to the on-screen hazards and sheets quickly become perilously congested. You'll need greased flippers if you aim to collect any pension!

It's standard fare of course, but I doubt if you'll see it better done.

KILLER SATELLITES

Without question the most challenging cartridge for the unexpanded VCS is *Defender*. The thing plays uncannily like its arcade parent and is guaranteed to shrivel the nerves with its fearsome speed. Since its release the cart has stood untouched in the 2600 library. That is — until now. Starpath's *Killer Satellites* not only mimics *Defender*'s play but surpasses its graphics with a dazzling visual flair.

The scenario has been given a different twist but the results are pretty much the same. As the test pilot of Earth's only rocketship you must scour the countryside for the first sign of an alien invasion.

The aliens themselves are superbly designed, being all manner of shapes and colours. The game lacks the mutant takeover routine but compensates with a meteor storm that's awfully tricky to outmanoeuvre.

PARTY MIX

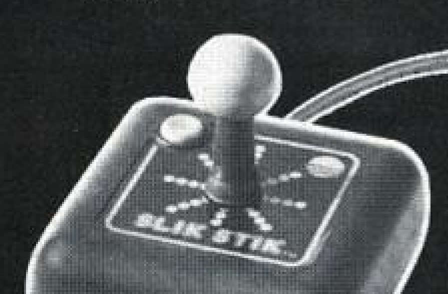
This is a scream! No less than FIVE totally barmy party games for between two or four players (no solo options), all of which are beautifully rendered and unbelievably noisy. However this is included for just one load, *Tug Of War* — never have I laughed so much at a video game!

The idea is simple: one paddle controller pulls the red team and the other the blue. To make your guys tug you have to hit your fire button. The faster you hit the harder they pull. Can you imagine the scene as the starter fires? Two supposedly adult individuals frantically pounding their buttons in order to make their teams move? Good grief — it's ridiculous! And if you're evenly matched the battle can go on for ages.

On my first attempt at it I collapsed in hysterics and had to be carted away.

. . . BUT IF YOU *LIKE* VIDEO WRIST . . .





Left: the Suncom TAC-2 — a real gourmet stick. Right: the companion Slik-Stik employs minimum movement.

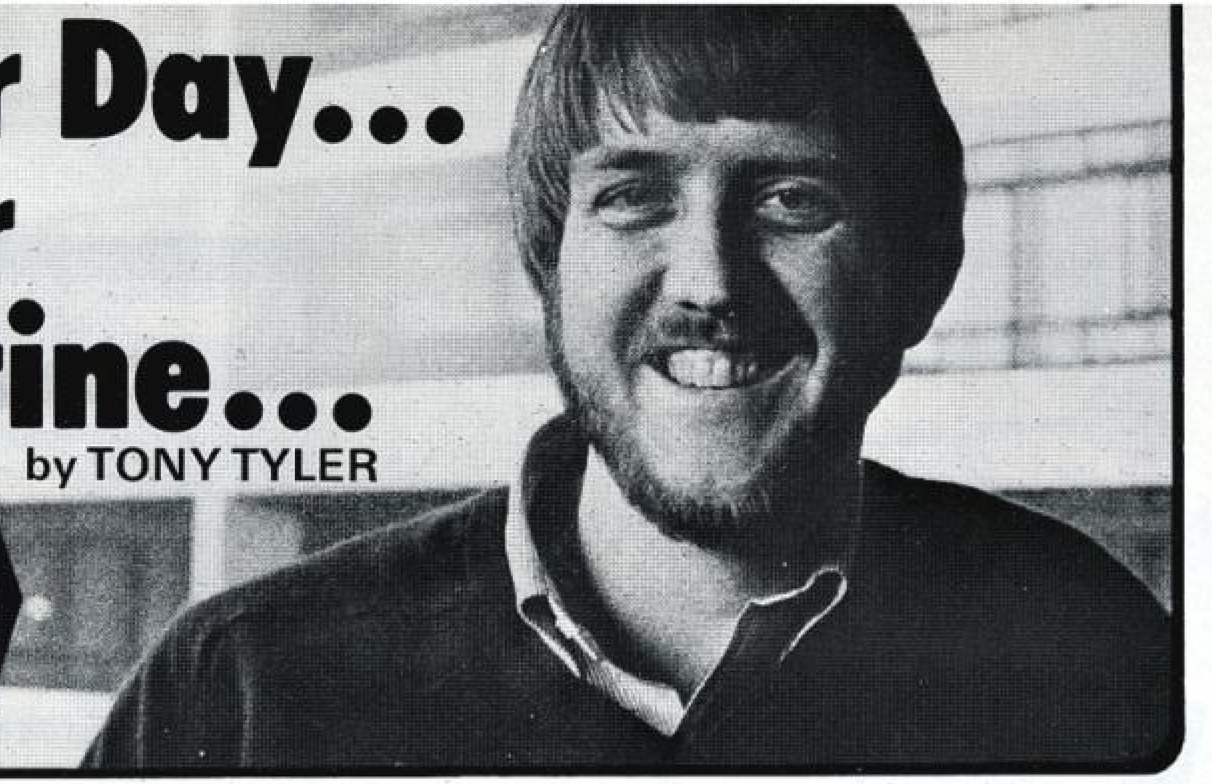


Aerobics, girls? This little number attaches to the bars of you Anti-flab bicycle.

Despite the trackballs, joysensors and other exotic controllers, most of us are still left with joysticks to fulfil our alienocidal fantasies. Here is an area where progress has been rapid. Many companies now market "gourmet" sticks for discerning alienocides. These are from Suncom (like the Joy-Sensor on the previous page) and fit Atari-/Coleco/Commodore ports. The Tac-2 is the most expensive at £18.95, but you can slum it with a Slik-Stik for half the price, or even gerron yer bike and do a Tebbit with the Aerobics Stick.

Another Day... Another Subroutine...

by TONY TYLER



*DAVID CRANE, Chief Designer at US ROM-specialists Activision — and famous as the writer of **Pitfall** and now **Decathlon** — takes a dim view of anything upmarket of a 2600 VCS Atari. "Revolution?" he says. "What revolution?"*

WHEN YOU formed Activism, to what extent did you find yourselves prisoners creatively of the machine to which you pitched your earlier games — the Atari 2600 VCS which, although the definitive dedicated videogame machine, is by any consent limited technically and architecturally?

The limitations have always been the fun part. The 2600 has limitations as do all machines. But this hardware, which has a very simple architecture, requires the *most* of its software! Differences between games were and are almost entirely a function of the software — which was and is removable. Therefore at the time you mention this was the most versatile machine of all. It still can play the widest range of games. I can't say that we've only just scratched the surface, even now, but there's lots of things that I can do right now that I've not done before and I'm sure that there's just as many that I won't think of until I think of them!

Do you think that the first game-machine and computer designers made a mistake in opting so heavily for the expensive ROM-cart format rather than cassette? Considering that it's widely held that the commitment to the ROM-cart games machine has been said to have held back the personal computer revolution in the USA?

There's certainly been an over-production of ROM cartridges. The problem was the high profit margin, drawing lots of companies in — we knew at the time they didn't have the qualifications. What we didn't foresee was that every time an operation goes out of business it sells off its inventory! That's where the US ROM-cartridge glut has come from. As for the idea that the installed video-game base was holding back the computer revolution — well, I kind of chuckle. First of all, no-one really has a use for a personal computer and no-one can think of one. And the manufacturers can't think of one to tell them! Right now a home computer is nothing more than a video-game machine with a keyboard.

"A home computer is nothing more than a game machine with a keyboard . . ."

And until someone does come up with a real use for a home computer, there *is* no revolution.

Could you describe for us the actual process that leads to the conception and design of a game such as *Pitfall* or *Decathlon?* From beginning to end.

Well, I might start by simply staring out the window wondering what kind of game I'd like to play. 20 per cent of the time I might actually see an incident that gives me an idea. But if I'm designing a sports game, the rules — like for *Decathlon* — are already defined, and the problem is how to make the hardware achieve those effects in that sequence. I then sit down with a piece of paper and draw the screens that will do the job. And obviously I do the drawing knowing what the hardware itself can and can't do.

Once I get it down on paper I go right to the machine. What we have is a Digital Electric PDP-11, a relatively large minicomputer which communicates with half a dozen different workstations — we timeshare. This gives me a place to keep my sourcefile. It allows me to edit the file and put it into assembly language.

Do you identify beforehand those screens or routines which are likely to give you the most trouble and go for them first? Or do you write sequentially, taking the problems as they come?

I start with the harder bits. It's difficult on a machine — that was never intended to display more than balls and paddles and maybe a couple of tanks shooting at each other — to make it handle, say, a running man. So the first thing I had was a couple of legs running across the screen with no body attached.

You pull that off very smoothly in both *Pitfall* and *Decathlon.* How many frames are there in the moving legs sequence?

You could say ten frames. You could also think of it as twenty frames!

And the shadow?

That was fun. To get the shadow to stay on the ground and not rise with the man when he jumps was one of the early problems. But in general you could say I program in small modules. I write a certain routine and make sure it works before I go on to anything else. I have an overall picture in my mind as to what I'm going to need. I always like to design one routine and have it working perfectly before the end of the day before I go on to the next one.

So a subroutine roughly equals one day's work?

I don't like to go home with an unwritten program hanging over my head. That's me. Now Al Miller [Activision colleague], he'll sit in a rocking chair for three days writing the program — he writes most of it at that time. Comes into work, types it in, pages and pages, turns it on and sees what happens. I can understand that but it's not the way I work.

You think in assembly language?

Probably easier than English.

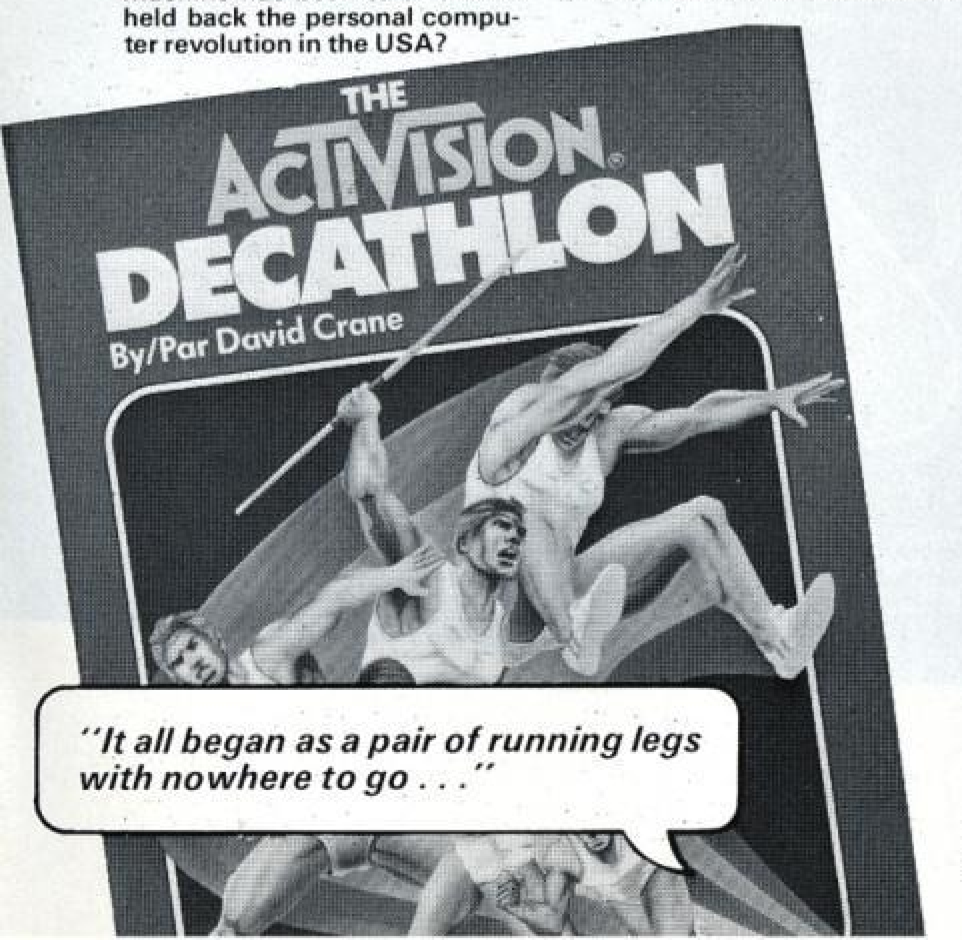
What gave you the idea for *Pitfall?*

I started *Decathlon* before *Pitfall*. I had the running man OK, but then I realised that at that time I would not be able to do a ten-event Decathlon justice. So I shelved it. Then I did *Pitfall*. I had to get the running man idea out of my system. OK, there he is, running across the screen. What next? He goes to another screen. What now? So I might as well put him on a path. Jungles have paths — better throw in a few trees — always bearing in mind that I'd want to be able to do this for other machines. Basically, if you can do it on the VCS, you can do at least a shadow of it on other systems.

So anyway, what use is a jungle path unless it leads somewhere? So I pencilled in a few objects. How about some places to fall? A few holes. He's got to land somewhere — I had to put in an underground level. Then I spent the next two months defining the game, saying where do I put the treasure, what kind of monsters lurk? Scorpions look pretty good. I thought I might have ghosts and skeletons in the tunnel — none of them looked good, so they didn't get in. We drew a lot of these beforehand on squared paper, colouring them in and so on. But it never looks the same on the screen as it does on paper — never.

Finally, I might spend six months on a program just doing things that you would hardly be able to tell weren't there before. It's that which people notice — even subliminally. Bug-freeness. Freedom from bugs.

The last 10 per cent of the game takes ninety per cent of the time.

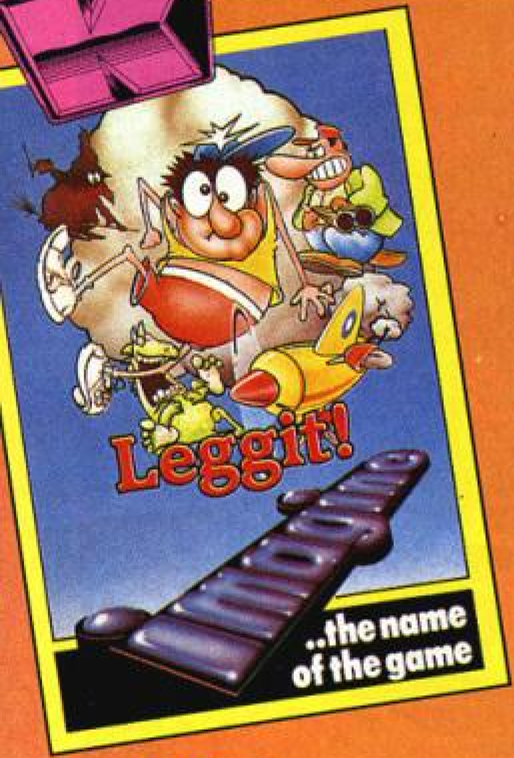


"It all began as a pair of running legs with nowhere to go . . ."



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Reviewers:
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Paul Rambali
Tony Tyler
Steve Keaton
Andy Green
David Crossweller



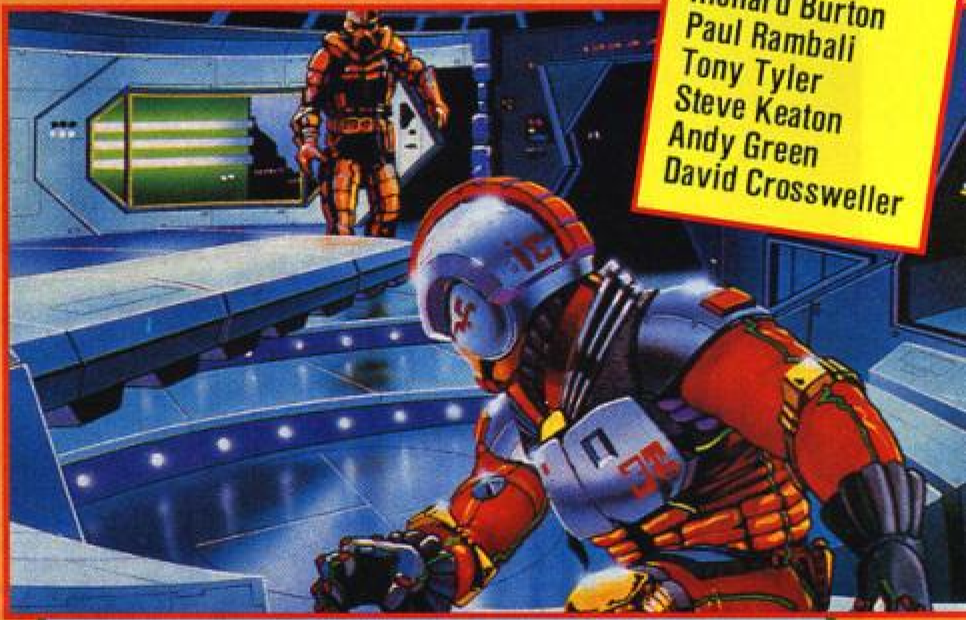
KEEP TAKING THE PILLS

Whoever dreamt this one up should be wreathed in manacles and incarcerated in some dank and horrid place. Like Belgium. Never has a game infuriated me so! I can take legions of alien craft, maniac miners, rampaging apes . . . even *Q*bert!* But this . . . Words fail me.

Leaping Lenny stands at the bottom of the screen. Above him rattle eight conveyor belts, each one punctuated by gaps. For reasons best known to himself, Lenny wants to climb the screen and so you must leap him through the moving gaps. If you mistime your jump you'll brain yourself on the above conveyor and collapse unconscious in a heap. The gaps become more numerous the higher you get, so unless you move fast you'll plummet back to the level you've just leapt from. If you ask me the entire thing is just impossible. Apparently there are nasties to hinder your progress on subsequent sheets but I can't confirm this. I haven't made it that far.

I once got halfway up sheet one but brained myself at an inopportune moment and so toppled hopelessly back to the start. Believe me, the language to be heard wasn't sweet. This is one of those games in which the graphics are pretty incidental. There's little to be seen — although Lenny *is* nicely animated. The gameplay is the thing — and here it couldn't be tougher. Now if you don't mind I think I'll go check my blood pressure. — **S.K.**

Game: LEGGIT
Maker: IMAGINE
Machine: DRAGON 32
Format: cassette
Price: £5.50
Rating: KK

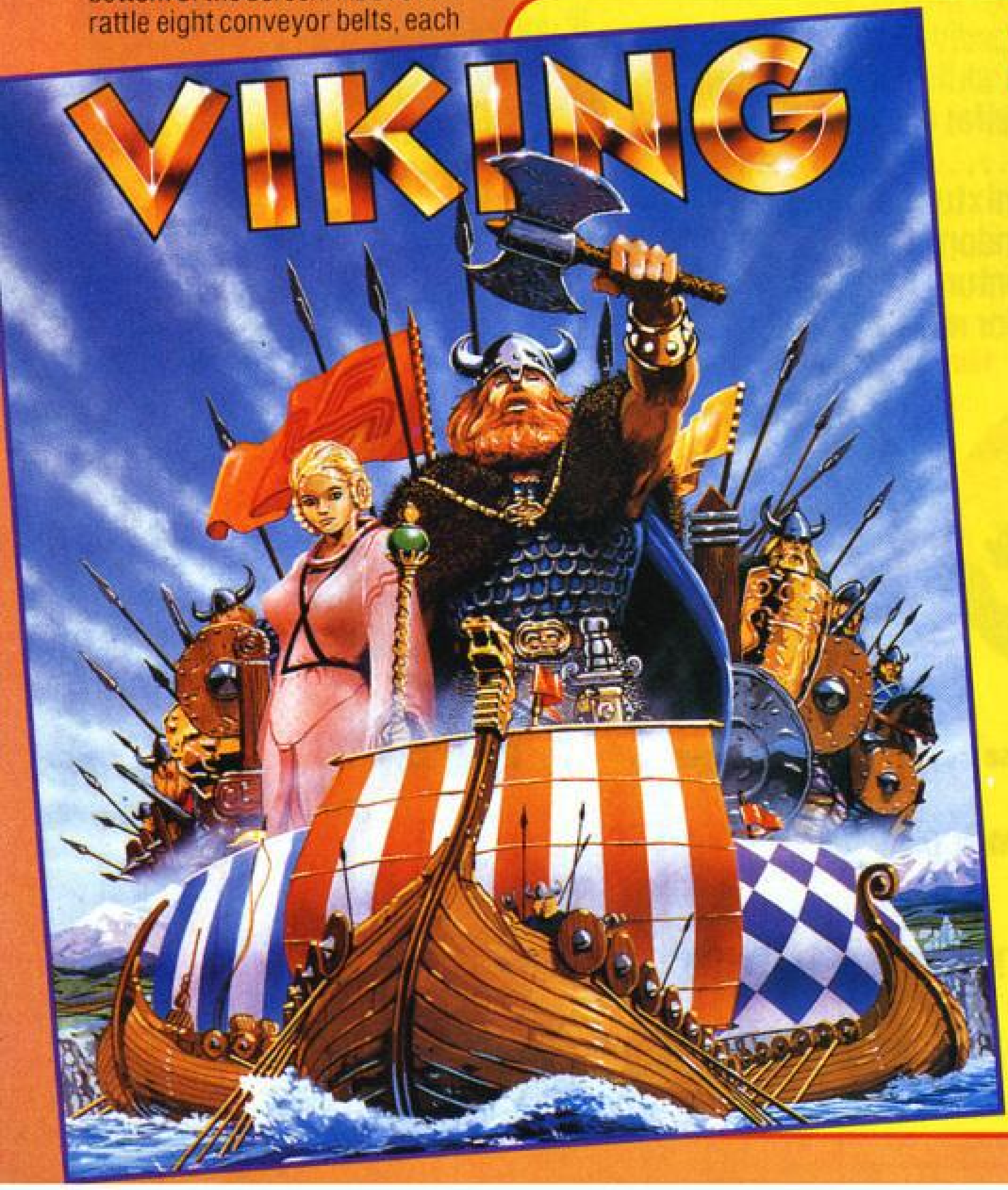


Although claiming to be a graphical adventure, *Cimeeon Moon* is in reality a conventional 3D maze game. You are stranded onboard a deserted alien ship. The crew, who were once your enslavers, have mysteriously vanished and the door to your cell is unlocked. Can you discover a means of escape before they make their return? Do you even want to?

There are a number of items to be found, such as shield belts and Vacsuits which may prove of use, but you'll have to search hard for them as they're fairly well spaced out. The maze itself is nicely drawn but the game is infuriating. The commands you can use are limited and there are no responses given so don't expect any witty repartee. In fact the computer's vocabulary consists of little more than a rather childish 'Oopie!', which hardly inspires confidence.

I rapidly became cheesed off with the thing. Progress is slow if not impossible and rewards are thinly spread. *McKensie* (Software Projects), which runs on the Spectrum, is a *real* adventure with exactly the same scenario. Now I know which one I'd rather play . . . — **S.K.**

Game: CIMEEON MOON
Maker: DRAGON DATA
Machine: DRAGON 32
Format: cassette
Price: £7.95
Rating: None



Let's hear it for Norse Code

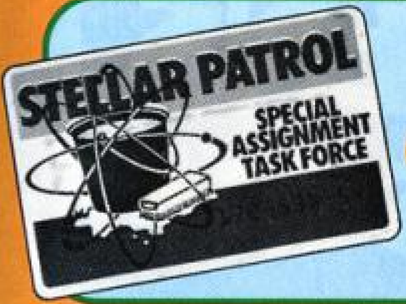
Have you ever fancied yourself as Hagar the horrible? If you have then this simulation of running a Viking holding around the year seven hundred will be just the ticket. You'll have all you've ever wanted: power, glory, fishing boats . . . even one of those funny Nordic helmets. It's amazing what micros can do. Within minutes of loading I had become . . . Steve of Oslo! Proud owner of two ferrets and a fishing boat! My reign of terror was about to commence . . .

Up to four players can enter the simulation and there are nine levels of difficulty. The computer will ask you a series of questions and your answers dictate how the holding survives. The questions follow a logical sequence through the course of the year. You are told how the weather affected your crops, how much grain is necessary to feed your people, and so on . . . There are options to train slaves as guards, build market places (should your treasury allow) and buy ferrets. The later are not luxury items as you might imagine, but required purchases to quell the rat population. I found this out to my cost with an outbreak of plague before the paint had even dried on my hut.

Still, you soon get into the swing of things. I upped the taxes at the earliest opportunity and starved the peasants so as to buy that new temple I'd always wanted. The roar of the fjords was in my blood! Provided you can temper revolts and avoid natural disasters there's nothing to stop you rising from humble Holder to Duke or even King. The game has been carefully designed and is easy to follow. I found it all exceptionally appealing. Now, if you don't mind, I must dash — the peasants are revolting (again). — **S.K.**

Game: VIKING
Maker: DRAGON DATA
Machine: DRAGON 32
Format: cassette
Price: £7.95
Rating: KKK

K = Could Be Better
KK = Could Be Worse
KKK = Unsurpassable



THE GREATEST STORY EVER TOLD?

INFOCOM, AN American company, have been about for several years. They first made their name by writing the excellent *Zork* trilogy, a series of adventures so cleverly written and subtly interwoven that it's got its own *Zork* fan club with stickers and the like.

The INTERLOGIC TM System that Infocom uses to create the adventures has its critics. It works on text only. People who've played *The Hobbit* or *Valhalla* will instantly think "Hah! Garbage!" But look at it this way. Take the pictures out of *Habbit* or *Valhalla*, and you're not left with a very good adventure. Infocom have used the memory space graphics adventures would otherwise take up and put it towards making a far better game.

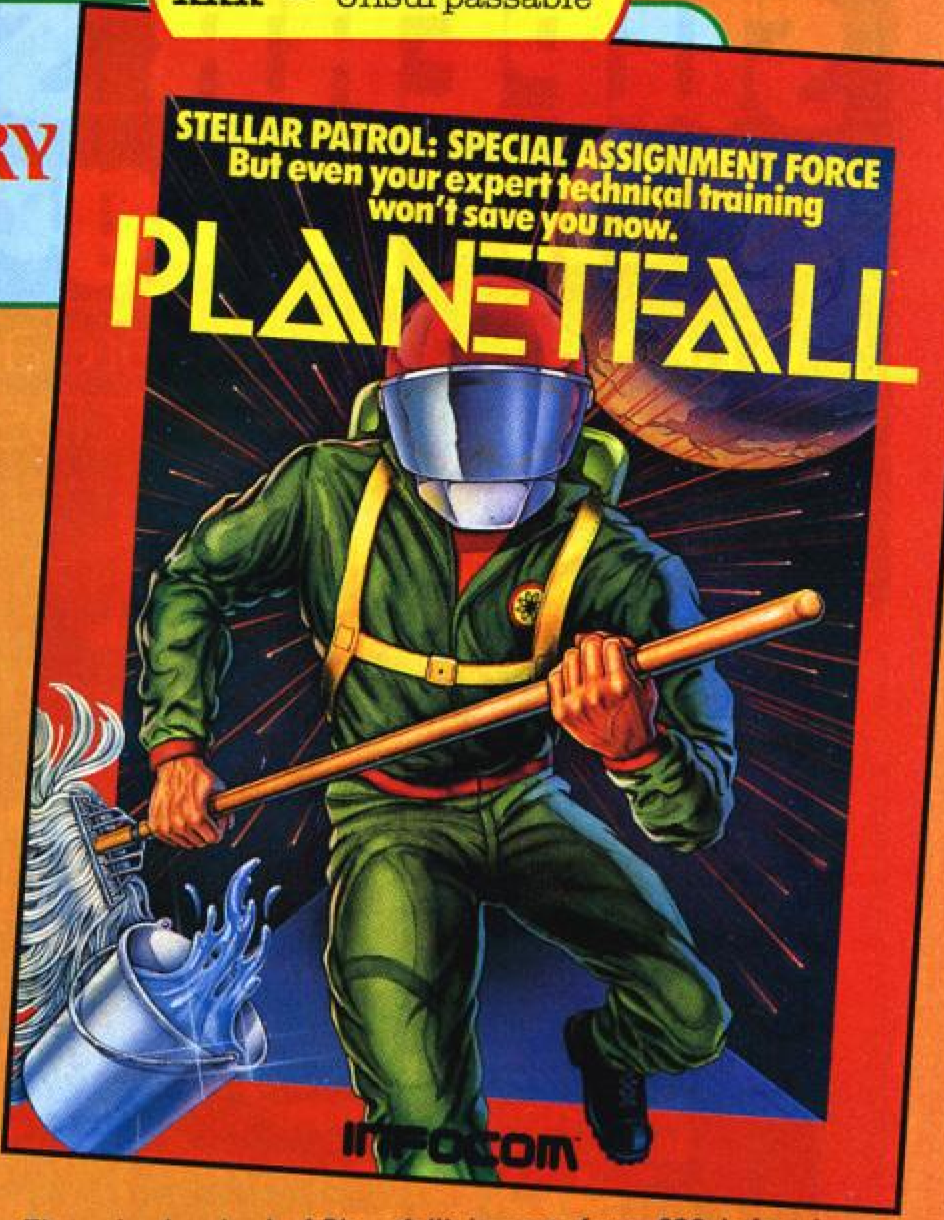
This means that Infocom adventures won't have the instant appeal of the pretty (for a Spectrum) pictures, but (as Infocom point out) well-chosen, carefully-selected words paint a mind-picture that no mere primitive 2D image can compare with.

Because the adventures are large and complex, you have to have a disc drive to run them on. And they're only available for the Commodore 64, Atari 800, Apple II and IBM — all American micros. Pity.

Planetfall is of course written in machine code, but because it's so big the bulk of the program is actually stored on disc and called up when it's needed. On the Commodore 64, the command processing time is reasonable, but a touch slow (this I suspect is due to the unbelievably slow disc drive Commodore sells).

At the start of the game, you are a poor, downtrodden ensign (7th level, your ID card informs you bleakly) aboard a spaceship, the S.P.S. FEINSTEIN. You have only your scrubbing brush, and orders from a certain Ensign Cadet First Class Blather, who storms about the ship terrorising innocent ensigns like a cross between a geography teacher and God. You will meet alien ambassadors, a demented robot called Floyd and other characters during your explorations of various planets and deserted institutions. Strange mysteries need to be solved. Identity cards need to be found. And you'll need sleep and food too . . .

Commands are entered into the computer in full sentences that need almost no modification to be understood. The computer responds intelligently and often very wittily. Another excellent point in *Planetfall*'s favour is that the game is not always exactly the same each time you play it.



The major drawback of *Planetfall* is its cost of over £30. In fact, in Lion House, Tottenham Court Road, London, it was going for £37. But it's the best adventure game you'll see for quite some time. — A.G.

Game: PLANETFALL
Maker: INFOCOM
Machine: Commodore 64, Apple II, Atari 800, IBM pc
Format: disc
Price: £30.00
Rating: KKK



This D is really 3

When the history of 3D-effect maze games comes to be written, *Android Two* will be marked down as a classic of its kind. A superb attract mode that sweeps you across the maze field gives the first taste of the stunning hi-res graphics and brilliant colour that makes this game so distinctive. When play starts the maze comes to life with bright, bustling objects — there's movement everywhere! Game object is to guide your android through three increasingly difficult zones and bump off five ferocious Millitoids in each. Hazards come in the forms of Hoverdroids, Bouncers and landmines, all of which are fatal to the android. The screen shows a section of the maze and scrolls smoothly in any direction as the android moves around. Action is fast and challenging, thanks to the 100% machine code programming. There are full on-screen instructions plus joystick option. A thoroughly professional presentation and a must for any library. — **R.B.**

Game: ANDROID TWO
Makers: VORTEX SOFTWARE
Machine: SPECTRUM 48K
Format: cassette
Price: 5.95
Rating: KKK

NORMAN TEBBIT WRITES...

Personally, I find politics and economics pretty boring. All that stuff about minimum lending rates, wage rounds and economic forecasts. Dreary stuff, man. That was until I discovered *1984* from Incentive Software. This strategy game changed my life by putting me in charge of the Government and the economic survival of the country. It was then that I tasted . . . POWER! Ha, ha! I love it! Soak the rich! Sponge the poor! Drive up inflation! Send wages through the roof! It's great! You can do all this and more with *1984* or be really boring and try to keep the budget balanced and get through three general elections unscathed. Based on the actual 1982/83 figures for the British economy (3 million unemployed and all) this is a clear, concise, well-presented game. Performance graphs and good prompts on all sections make it an extremely easy game to get into for the novice. It's surprisingly enjoyable. And then there's all that lovely POWER . . ! — **R.B.**

Game: 1984 A GAME OF GOVERNMENT MANAGEMENT
Maker: INCENTIVE SOFTWARE
Machine: SPECTRUM 48K
Format: cassette
Price: £5.50
Rating: KKK

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TWO FOR THE PRICE OF 1⅓ GAMES

With every game on the market trying to blow your eyes out of their sockets with dazzling graphics it's nice to come across a couple of games that don't look much but play well. *Alien Swarm* is your basic, no-frills space invaders. Aliens, looking no more ferocious than horses wearing nosebags, rain down on your laser base. You get 50 aliens to start with and a running check is kept on the number remaining. Points value and speed increase after each base hit or wave completed. Keyboard control only but very responsive action. Sound is pretty poor. *Arena* is an absorbing original that has you in control of a small figure at screen centre carrying a moveable shield. Objects ricochet around the arena and come at the figure from all angles. You have to make sure that the shield's in the right position to deflect the object. Points for each deflection, one life (of five) gone if you miss.

Oh yes, and just for good measure the walls are closing in on you.

Limited side to side movement is possible but uses up energy. Seven skill levels and ten speeds give enough variety for the most demanding player (try speed 0, skill 1 — you won't last 20 seconds!). There's also a useful demo mode. An enjoyable game that combines tactics and plain arcade action. All in all, two good games on this K-Tel Doublesider for under £7. Guess you could call that value for money. — **R.B.**

Game: ALIEN SWARM/ARENA
Maker: K-TEL
Machine: SPECTRUM 48
Format: cassette
Price: £6.95
Rating: KK

HOLD THE GARLIC BUTTER

I guess ***Centipede*** *is one of those games which just can't fail to be exciting. There are literally dozens of versions and all manage to generate a healthy amount of perspiration; you'd have to do something drastically wrong (like forget the Centipede) in order to spoil the formula. This one is no exception to the rule.*

The graphics are chunky but acceptable, the sound surprisingly butch and the gameplay adequately fierce. There are no less than nine speed variations, of which I found the top three acceptably fast, plus all the usual bonus features. Snails crawl mindlessly across the screen disgorging bucket loads of lethal little 'uns and an elastic snail boings gleefully around your weapons system. Of course the thing calls out for trackball control, but failing that joysticks are a reliable substitution.

Like all Dragon programs it loads with nary a hitch and seems well worth the money. I can also safely predict that this'll be the nearest I get to doing any sort of gardening all year. — **S.K.**

Game: ULTRAPEDE
Maker: SOFTEK
Machine: DRAGON 32
Format: cassette
Price: £6.95
Rating: KK

GOTCHA!

Picture the scene: You're alone at the base. The chill South Atlantic wind cutting through your long johns . . . when suddenly the air-raid sirens sound! The enemy have launched a surprise attack on the airstrip and there's only you to protect the place. Time to leap into your jumpjet and scramble! The day of reckoning has arrived.

Unfortunately despite the initial promise of the setting, *Jumpjet* quickly proves itself to be something of an old duffer. The game is agonisingly slow, which is not surprising considering that it's written in Basic, and something of a chore to play.

Having shot down the enemy bombers which threaten your base you're allowed to fly on and attack the opposition's fortress across the sea; however, considering the amount of time it takes to scroll across the landscape you may have second thoughts about undertaking the mission. I know I did.

Graphically, though, it's OK and the program does boast some rather novel computer-speak. As enemy bombers loom overhead, the program will proclaim in somnambulant tones: "Alert! Alert!" and other such similar things. All rather frivolous, but entertaining nonetheless. — **S.K.**

Game: JUMPJET
Maker: DRAGON DATA
Machine: DRAGON 32
Format: cassette
Price: £7.95
Rating: K



FTL *IS* POSSIBLE

This is a blindingly fast sci-fi dogfight program that thrills through its sheer speed rather than any gaming innovation. You command the Starfighter, a gleaming, high-speed rocket ship whose job is to protect the surface of your planet against alien modules 'n' podules. A rather thankless task that offers few rewards. Speed is all that counts.

Even on the slow option, your Starfighter travels at an eye-aching rate of knots. So much so that it's difficult to control. At first I had a hell of a job just keeping the thing in the air, let alone worrying about all the adversaries on offer. The pips would sound and I'd go hareing off into the first available mountain. Still, I eventually managed to get to grips with the rather pendulous motion of the ship and could begin to concentrate on the game. What there is of it. The only variation it offers on the scrolling dogfight scenario occurs when you exceed certain score points. The screen becomes dark, presumably representing nightfall, and the swarmers hatch out. Unfortunately night-time is fleeting and you're soon back where you started.

Like a lot of Dragon software, it's a compromise. The ingredients for a great game are there but none is fully exploited. This comes across as a sort of skeletal *Defender*; had it included a greater variety of aliens, some humanoids to rescue . . . a generally stronger theme — it may well have been a classic. All in all something of a missed opportunity. — **S.K.**

Game: STARFIGHTER
Maker: DRAGON DATA
Machine: DRAGON 32
Format: cassette
Price: £7.95
Rating: K

ZAP! P.O.W. 12

"So, Britisher *schwein*, you dare to escape the Chermans — then suffer the torture of the toothpaste tubes!" It does look this way in this *'Doublesider'* cassette from K-Tel — one game seems to be a punishment for enjoying the other. *Castle Colditz* is a reasonable text-only adventure in which you are trying to escape from the notorious WW2 prisoner-of-war camp. On your way out you must collect objects to help you overcome hazards, not to mention picking up a few items of Nazi treasure.

Turn over the cassette to face *Battle of the Toothpaste Tubes* if you dare! You're in control of a large blue toothpaste tube which can shoot bolts of paste at vertically scrolling toothbrushes on the right or drop paste on horizontally scrolling pink tubes below. A silly, confused game that would have been a waste of money sold on its own. — **R.B.**

Game: CASTLE COLDITZ/ BATTLE OF THE TOOTHPASTE TUBES
Maker: K-TEL
Machine: Spectrum 48K
Format: cassette
Price: £6.95
Rating: K



Wilberforce and Freddie are the best of muckers. They eat in the same vegetarian restaurants and like nothing more than a lengthy discourse on the Meaning of Life while on duty in the royal fields. So just imagine Wilberforce's chagrin when poor old Freddie is abducted by the dreaded Hawk. In desperation he grabs his shotgun and fires.

Now I must admit this peculiar offering had me a little puzzled at first. I read through the instructions, peered at the screen and squeezed my fire button a few times — but had no real idea as to what was going on. 'Blast the flies but avoid the larvae,' I was told. Fine, I thought, but who are the flies? Much pondering was undertaken before the penny dropped. The idea of the game is to save Freddie from the clutches of the Hawk.

This is not a game for those with poor eyesight. The characters are so tiny I had to abandon play for fear of terminal eyestrain. — **S.K.**

Game: DRAGON HAWK
Maker: MICRO DEAL
Machine: DRAGON 32
Format: cassette
Price: £8.00
Rating: K

MY EYES! MY EYES!

Postern's *3-Deep Space* for the BBC B is the first 'stereoscopic' 3D game I've ever seen on a popular micro. It is supplied on tape in two parts, the first in BASIC to set up the 3D background, and the second in machine code to actually get all the objects moving at a reasonable speed.

It loaded first time with no errors, the landscape generator loading up first giving your eyes a chance to adjust to the effect. Well, on my monitor at least, it worked up to a point. Something wasn't quite right, because when I moved my head, the object furthest away moved fastest!

The point where a brief message ("S to Start") appeared was where the game began to fall apart. The instructions had neglected to mention which keys to use, but I eventually found them by trying all the possible contenders.

The game itself consists of nasties, who move in one of eight 'depths', coming towards you from the right-hand side of the screen, moving up and down (but not in and out) at regular intervals. You must sit on the left-hand side of the screen, moving in and out, firing a 'bolt' at the nasties. If a nasty hits you when you are both at the same depth, you lose. Predictably, this gets a little boring after a while, as the marauding aliens take no more exotic shape than simple diamonds. I guess the author (Mike Singleton) used so much memory getting the effect right that he ran out of space for such desirable amenities as complicated aliens. The aliens do change shape at a set score, however, so all is not lost — but you only get one 'life', there's no high score sheet, and I thought he really missed an opportunity for a *Defender*-style explosion in 3D.

The gameplay seems to have taken second place to the gimmick, but nevertheless this program is still worth looking at. Literally. — **A.G.**

Game: 3-DEEP SPACE
Maker: POSTERN
Price: £
Machine: BBC
Format: cassette
Rating: KK



ONE MORE FOR THE ROTOR ROTA

Pleasant if unremarkable version of that *Scramble* clone, *Supercobra*, in which you pilot a mega-helicopter across and through mountainous terrain infested by kamikaze forces. Naturally the idea is to wreak as much havoc as is humanly possible. No, this is not a game of intellectual subtlety.

You begin your run with four ships. Each time one is lost the game restarts automatically at the point you left it. Apart from all the ground-to-air missiles, there's the enemy's fuel depots to look out for. You have to take these out in order to maintain your own supplies, although how this magical replenishment is achieved I can't say. Flying saucers and rocketballs come as standard but the program lacks an enemy fortress as a climax. For me this rather dilutes its appeal, reducing the action to rather aimless carnage.

The graphics are crisp, if a little simplistic, but the sound is very good with the 'Whup-whup-whup' of the chopper's rotor-blades being nicely reproduced. Be advised that potential pilots will need a joystick to get airborne. — **S.K.**

Game: WHIRLYBIRD RUN
Maker: DRAGON DATA
Machine: DRAGON 32
Format: cassette
Price: £12.95
Rating: K









I opened the sprayed-gold cassette box and it promptly fell apart.

After that things got better.

The Alchemist is you, bub, and you've got to penetrate the inner defences of (yawn) the Evil Warlock, which are terrible and labyrinthine and guarded by the usual crew of plug-uglies.

So far so normal. What makes **Alchemist** refreshingly different and huge fun to play is the all-graphic side to this particular adventure: in a way it reminds me of ColecoVision's **Smurfs**, except that here the playfield scrolls both ways **and** up and down. Steer the doddering old fool (the Alchemist) along the levels, transform him into an eagle for the levitational bits (a minor masterpiece, this routine, which never failed to bring a surge of satisfaction) and blast the marauding entities with lightning bolts, or a Lesser Spell (if you've found one), or — though I never got this far and can't imagine the effect — the Great Spell, which comes your way once you've found all four missing pieces of the Scroll etc., etc.

While the plot is yet another version of an old, old theme, the graphics really bring the **Alchemist** alive. Me? I kept getting bumped off for lack of Stamina (sort of Survival Points) — but with a little practice I'm going to get further and further into this maze. Animation and scrolling are superbly smooth, colours rich and imaginative, and the general feel one of 100 per cent machine code slickness. A neat conception, beautifully carried through. — T.T.

Game: ALCHEMIST
Maker: IMAGINE SOFTWARE
Machine: SPECTRUM 48
Format: cassette
Price: £6.95
Rating: KKK

Amazing what you can do with five crystal balls, four magic apples and a bit of creative writing. Why, you could almost convince someone this is not another variation on the well worn ***Dig Dug*** *theme. The action is, we are told, set in the lead mines of the ancient mystic land of Zeldor. Here Good Wizard Meltec tunnels about carrying out his eternal quest for lead (blue blobs) which he can change into gold. The mines are, of course, guarded by evil magic meanies (reject space invaders) who chase Meltec all over the place giving the poor chap a very hard time and using up one of his three lives each time they catch him. Meltec's magic doesn't work on Zeldor (so why make him a magician?) so he has to resort to the five crystal balls which he can fire at the meanies and the four magic apples which are scattered about the play area. The only thing 'magic' about these is that they can be dropped on the meanies to squash them (score extra points for this) or used to block their path. The crystal balls are only effective at long range as Meltec has to face his attacker. Most of the time he's on the run with a meanie hot on his heels and no time to turn and fire. Graphics are good and speed can be varied over nine skill levels. Sound is good if you can bear the 'Can-Can' repeated endlessly. (My gratitude to the programmer for providing an on-off facility for the sound.) There's also a very good high-score table which can be copied to the printer for those who want to frame their achievements. A fun game, yes. Magic . . . not really.* — **R.B.**

Game: MAGIC MEANIES
Maker: CDS MICRO SYSTEMS
Machine: SPECTRUM
Format: cassette
Price: £5.95
Rating: KK

Stonkers is quite simply one of the very best general's-eye-view battle simulations around — certainly there's nothing in my knowledge to touch it for the Spectrum. Designer/programmer John Gibson has developed the available memory artfully, preferring to sacrifice some screen area for the sake of high — if miniaturised — resolution on the remainder and what must be enormous amounts of data handling. The result — complete with panic-making tickertape "intelligence reports" which only serve to fluster you — is a fast-moving, multi-screen strategic war scenario.

Your overall map is of a corner of the world vaguely Middle Eastern in profile. You move a cursor to the part you want to zoom on, touch a key . . . and there you are — the zone in close-up, complete with military units (yours and your enemy's) and full topography. This smaller area will scroll if you push with the cursor; using this facility you "deploy" (i.e. pick up and direct) troops. And — the nub of the opening strategy — each group of units must have their own supply train; or you start getting piteous bleats by way of tickertape. Eventually units peter out altogether for lack of . . . what *can* be in those trucks? Then comes the combat.

Much of this game reminds me of the programming style of American designer Chris Crawford, now with Atari, who wrote *Legionnaire* (Avalon Hill) using many of the same quiverful of programming "licks"; automatic deployment, for instance, with units boldly plodding whence they're bidden. The smoothness and reliability of the action and the urbane tricks to delight the eye (the tickertape is great), all testify to a wholly professional piece of work. Kriegspielers will love it. — T.T.

Game: STONKERS
Maker: IMAGINE SOFTWARE
Machine: SPECTRUM 48
Format: cassette
Price: £6.95
Rating: KKK

The vast golden face beamed at me, bathing my awestruck countenance with radiant light. "My speciality", it said, "Is reincarnation. Prepare to return."

I was stuck inside of **Xadom** with Adventure Blues again.

Like a spring lamb I flitted and weaved across the floor towards the far wall, where three gateways flickered with ominous lightnings. As Agent Dingbat (somehow I can never stand to type my real name into one of those games that demand a preliminary handle), I had to search the multi-roomed spacedome and locate a missing widget; then escape by means of a pre-planted transporter.

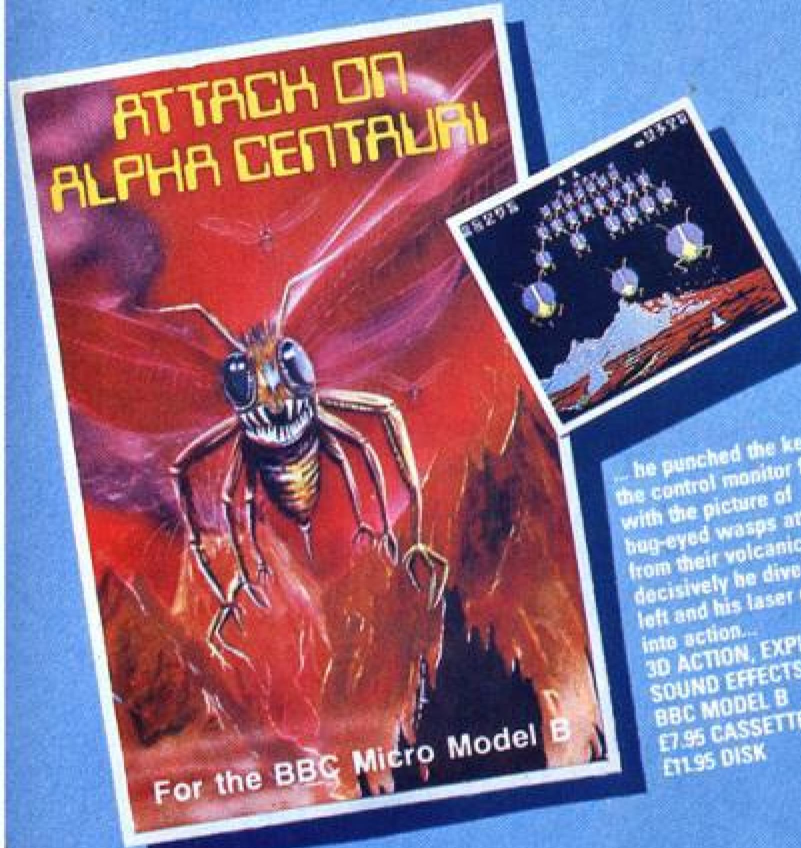
If they can transport me **out** why couldn't they beam me **in**? As it is all these dratted 3D rooms look the same in outline, though each one is dotted with two or more kinds of hazards and obstructions, with freelance Minders of various hideous mien to be found in any location. Trickiest of all the room traps is the Dark Maze (tip: try the longest ways to the door of your choice first — you may be pleasantly surprised).

Each time you die — for lack of energy, or by being antimattered (what does it antimatter anyway?) — you get reincarnated — slightly drawn-out, this dying routine. Colours are good, 3D resolution sharp and imaginative, action smooth and the whole thing seems pretty well bug-free. Author Mike Moscoff knows his stuff and **Xadom** is a new way of doing things but somehow — to me, anyway — it failed to come over as a clincher. If you haven't done this one inside a week, is my guess, you won't bother to. — **T.T.**

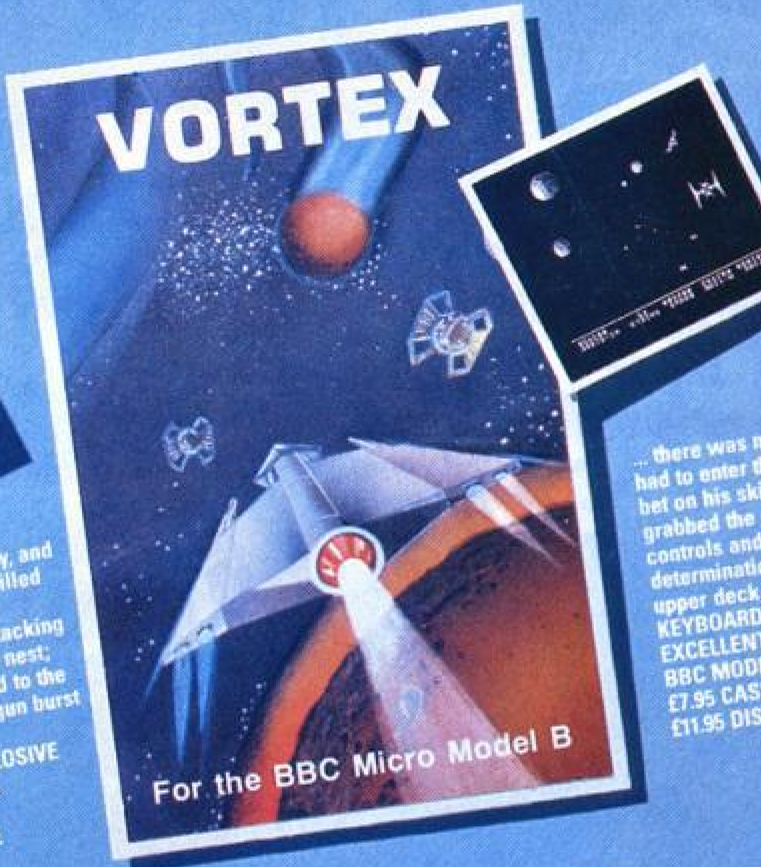
Game: XADOM
Maker: QUICKSILVA
Machine: SPECTRUM 48
Format: cassette
Price: £6.95
Rating: KK

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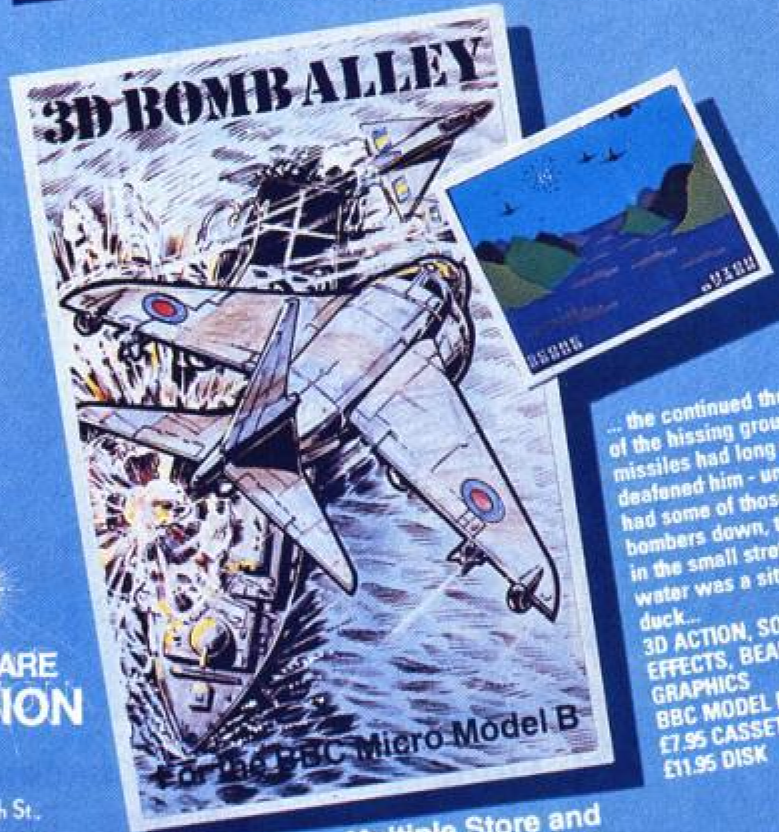
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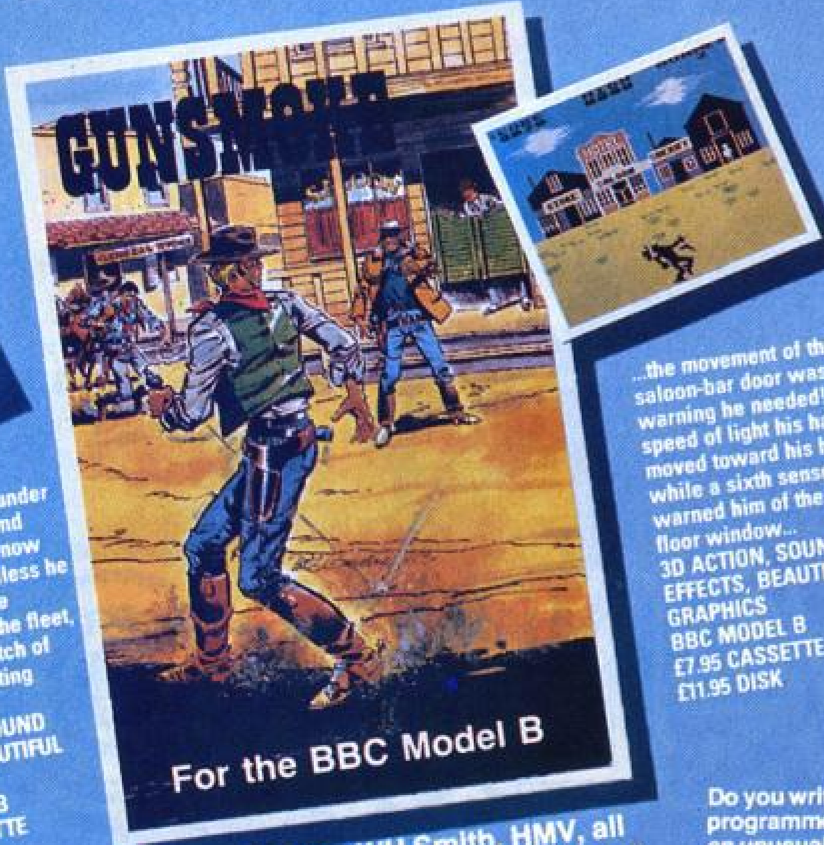
... he punched the key, and the control monitor filled with the picture of bug-eyed wasps attacking from their volcanic nest; decisively he dived to the left and his laser gun burst into action...
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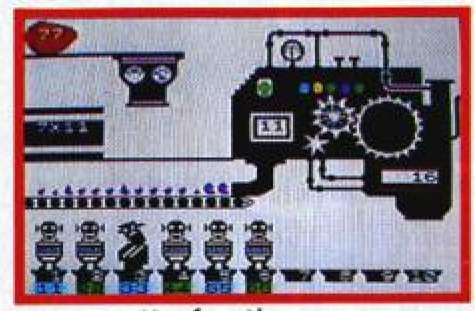
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Available now on cassette for the Spectrum 48K, Commodore 64, BBC B and Electron **£6.95**.

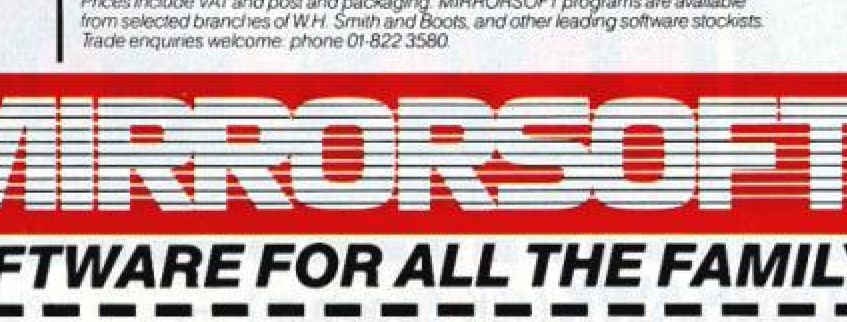
CAESAR THE CAT

by Andromeda Software

Meet Caesar, a cheeky young cat on duty in a well-stocked larder. He's kept busy chasing a gang of hungry mice eating the family's food. Playing against the clock, you guide Caesar along crowded shelves to pounce on the mice.

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WOZ

No, it's not a game — it's a name. The name of the man who, by inventing the personal computer, started This Whole Thing. JENNY PARROTT went on-line to Mr Apple . . .

IF STEVE WOZNIAK were to walk by you on the street he would hardly rate a second glance. If he were to brush against you in a video games arcade he would seem like any other laid-back Californian hooked on binary.

Perhaps the word which keeps springing to mind when thinking of Steve is "ordinary". After all, for a 33-year-old hippy-generation American he *looks* plain ordinary. He works for a large US corporation, has his phone number in the book, and used to be very shy. His spare time is spent playing with computers or with his young son, while jogging and playing tennis keep him active.

Yet underneath this unremarkable exterior hides a brilliant mind.

Back in 1975 — an era when major computer manufacturers still found it almost impossible to market software and had to resort to *giving* it away with the computers — Steve became responsible for the most tremendous shake-up in the computing industry yet seen.

He invented the first personal computer. Not only that, he worked on that protOtype in a den in his garage until it was a better model. This latest creation became the Apple II, of which over a million have been sold since its launch in 1976. What is even more amazing is that Steve managed to design and build the machine totally single-handed, as well as developing all the electrical engineering and software himself at that stage.

So what is it that is so special about the Apple II?

Quite simply it was the first of a completely new genre. Not only did it look like a desirable gadget, but it was also relatively easy for the non-computer buff to get something up on the screen. Moreover it was affordable.

Steve explains how he sees it: "The first Apple computers were not even designed as products. They were just designed to demonstrate at the local show and there was no intent to start a company, or have a product or anything.

"We took a lot of very unusual steps with the Apple II. By this I mean it was the first computer ever sold in a plastic case, with built-in colour and graphics as standards. It was the first of the low cost computers where the keyboard and video display were standard. It also used the highest density RAMs of the day, so it was state-of-the-art and there were a lot of things about it that all the other computers were doing a different way.

"All I cared about was having a PC board on my floor and a bunch of wires connected to my keyboard. It was Steve Jobs who had the more far-reaching ideas of a product that could be sold, that could be taken out of a box already completely built and ready to be plugged into a wall, and then used to write a program.

Job's worth

"I thought pretty much as an engineer and a hobbyist and it was a good combination. But, you know, it is kind of like everything we did — just without knowing it at the time we had all the right things all together in one place and that is why we were successful."

Steve Jobs has been a strong influence in Steve's life since college days, always having the suss to get the most out of Steve's wacky ideas.

While they were both studying Steve happened to read an article in a magazine which explained that certain tones sent along a telephone line by a device allowed the user to have access to free phone calls. Naturally, Steve set about designing his own version of this device and soon came up with a tool which enabled him to call all over the world for free. Steve Jobs became a partner and soon the pair were doing a lively trade selling this device to other students.

Not surprisingly the phone company was not too pleased and pointed out it was illegal — in fact they fined him heavily. "But when you are a school kid this word illegal sure does have a different meaning. It was not like doing something you could get punished for," Steve explains, although the end result was to turn his attentions to studying video and electronic circuits, terminals and modems.

"I think that one of my interests is essentially getting into some Artificial Intelligence research but I am not really involved in that yet. I am a little more earthy right now and am wondering what will make real sense to normal consumers in the next couple of years.

"Eventually I do want to

Continued on page 70



Left: The Doomed Apple III Right: The megahit IIE

Right: LISA, named after Steven Jobs' daughter

NIAK



This man is RICH (the suit tells the story)

BOMB RUN

by PAT COOPER

```
90 PAPER4: INK3
99 PRINTCHR$(17)
100 TEXT:RELEASE:RESTORE
110 CLS:PLOT5,10,"Do you want
instructions?"
120 GETA$:IFA$="Y"THEN 300ELSE1000
130 REM
140 PLOT11,9,12:PLOT12,9,"PERFECT
LANDING"
150 RESTORE
160 RETURN
170 REM
180 EXPLODE
190 PLOT9,9,"Oh dear, you've crashed"
200 WAIT500
210 RETURN
230 REM
240 PLOT11,11,"Another Try ? (Y/N)"
245 GETA$
250 IFA$="Y" THENRETURN
260 IFA$<>"N" THEN245
270 PAPER0:INK7:CLS:PRINTCHR$(17):END
```

You are the highly-trained pilot of a super-sophisticated ground attack plane, bristling with deadly armament. Your mission? To clear the ruined city of your country's sworn enemies.

Simple? Not quite. Your target is at the very limit of your fuel endurance — and in addition, a great deal of the gutted city remains, making your low-level passes quite breathtakingly hazardous. Can you survive? To find out, load and run . . .

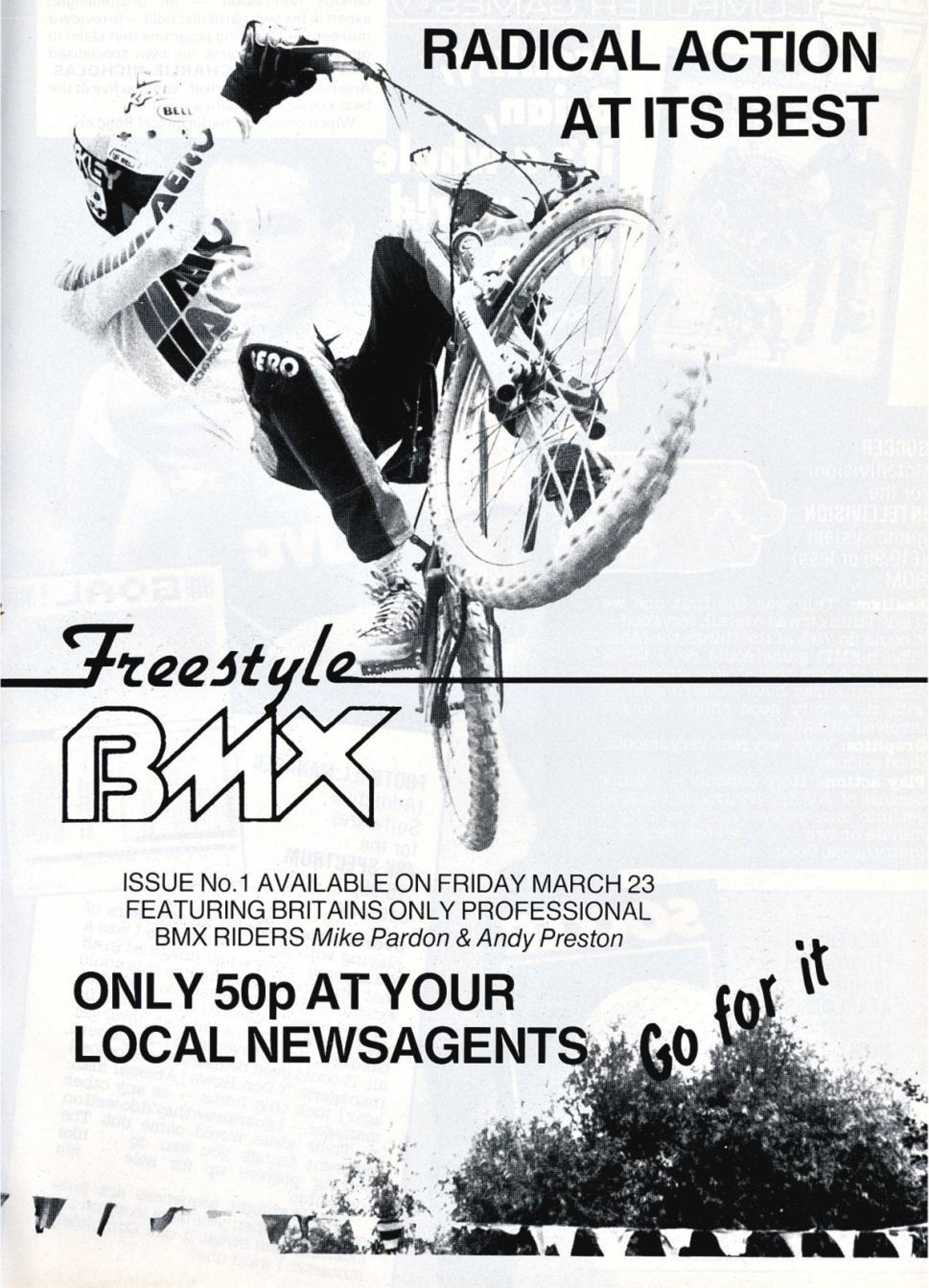


TRIED & TESTED -GAMES-

```
300 CLS:PRINT:PRINTSPC(15)"BOMB RUN"
310 PRINT:PRINT:PRINT"  Your bomber is
running out of fuel and you've got to
find ";
320 PRINT"somewhere to","land."
PRINT:PRINT"To do this, the buildings
below have got to be demolished."
340 PRINT:PRINT"To increase height,
press the Cursor Up key, but keep an eye
";
350 PRINT"on the Fuel."
355 PRINT:PRINT:PRINT"Skill level
(1=Easy,5=Hard)";
370 INPUTA:IFA<1ORA>5THEN370ELSE1000
400 REM
410 CLS:GOSUB700
450 FORX=1TO35STEP2
460 :FORY=INT(9+(RND(1)*15-D))TO26
470 :PLOTX,Y,"[]"
480 :NEXTY:NEXTX:H=3
490 RETURN
500 REM
520 J=K+1:G-X:F=1:IFJ>26THENRETURN
530 IFSCRN(G,J)=91ORSCRN(G<J)=93
THENW=W+1
540 PLOTG,J," "
550 RETURN
600 REM
610 PLOTG,J," "
620 IFW=2THENW=0:F=0:EXPLODE:RETURN
630 IFJ=26THENW=0:F=0:EXPLODE:RETURN
```

```
640 J=J+1:B-B+1:GOTO530
700 FORCR=1TO6:READC
705 FORCH=#B400+8*CTO#B400+8*C+7:READR:
POKECH,R:NEXT: NEXT
710 DATA123,48,56,28,63,59,54,1,3'{
720 DATA124,0,0,0,63,59,54,1,3'{
730 DATA125,0,0,0,62,31,62,60,0,0'}
740 DATA95,0,10,14,4,14,14,14,4'
750 DATA91,31,18,18,31,31,18,18,31'[
760 DATA93,62,18,18,62,62,18,18,62']
770 RETURN
1000 REM
1010 D=A: L=4: F=0: W=0:FL=30-INT((
RND(1)*D*4+1)):GOSUB400
1020 FORX=1 TO 36
1030 : K=H
1040 : IFSCRN(X+2,H)<>#20 ORSCRN(X,H)<>
#20 THENL=L-1:PLOTX+3,H," ":EXPLODE
1050 : PLOTX,H,"{ }":PLOT1,0,2
1060 : PLOT25,0,"LIVES: ":PLOT32,0,
RIGHT$("  "+STR$(L),2)
1070 : PLOT3,0,"FUEL: ":PLOT9,0,RIGHT$
("  "+STR$(FL),2)
1080 : IFL=0 THENGOSUB 170: GOSUB 230:
GOTO100
1090 : X$=KEY$
1100 : IFX$=CHR$(10)ANDF=0 THEN
GOSUB500ELSEWAIT(10)
1110 : IFX$=CHR$(11) ANDFL>0ANDH>3 THEN
H=H-1:FL=FL-1
1120 : IFF=1 THEN GOSUB 600
1140 : PLOTX,K,"   "
1150 : IFH>25 ANDX=35THEN PLOT
35,26"{ }":GOSUB 130: A=D+1: GOSUB 230:
GOTO1000
1155 : NEXT
1160 H=H+1
1170 GOTO1020
```



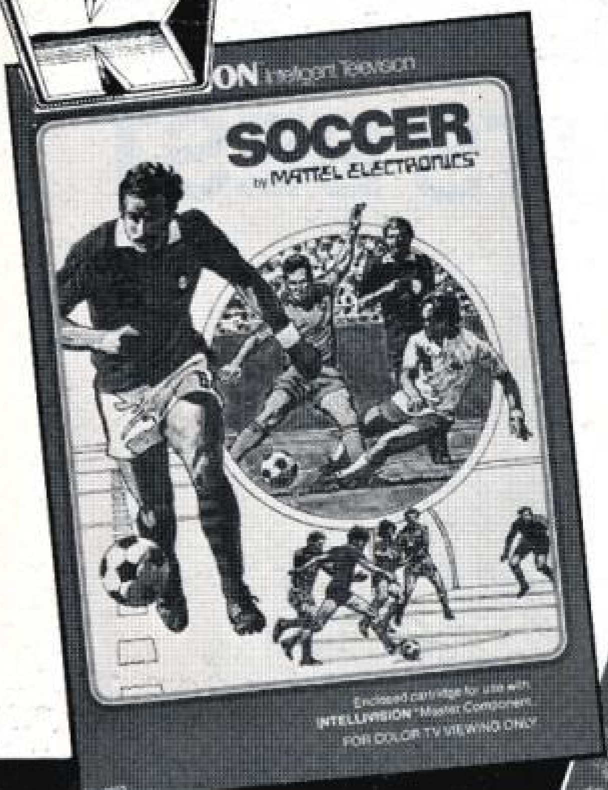

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Go for it

Each month, we'll be enlisting the services of a famous non-hacker — an unchallenged expert in his own particular field — to review a number of competing programs that claim to reproduce or simulate his own specialised area. This month, **CHARLIE NICHOLAS**, Arsenal F.C.'s star striker, sizes up five of the best-known footy games.

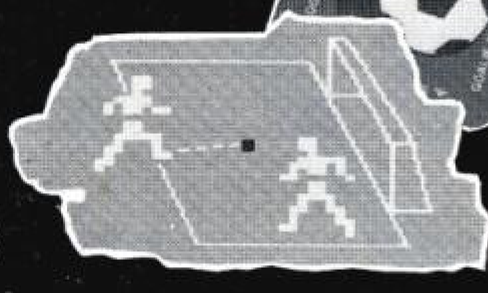
Which ones did Charlie go for? Read on . . .

Frankly, Brian, it's a whole new world to me...









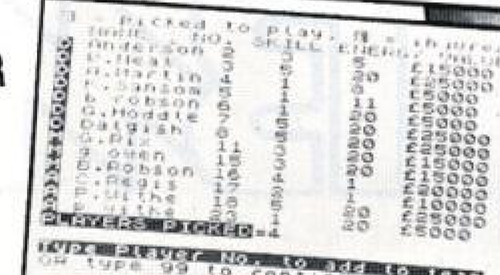
SOCCER
(Intellivision)
for the
INTELLIVISION
game system
(£19.95 or less)
ROM

Realism: 'This was the first one we tried? I think it was, overall, very good — it could do 75% of the things the other (Thorn-EMI) game could do. I think maybe the fact that it was written by Americans may have something to do with it. A very good effort. You got involved all right.'

Graphics: 'Very, very real. Very smooth. Good colours.'

Play action: 'More difficult — I think because of this disc control. But easy to get into once you've been into it for a minute or two — you get the hang of it pretty quick. Good.'

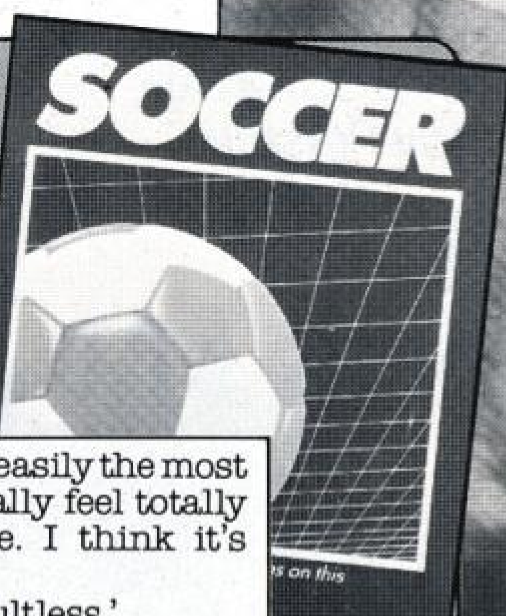




FOOTBALL MANAGER
(Addictive Software)
for the
48K SPECTRUM
(£6.95)
cassette

Overall comment: 'In all my years of playing with toys — ever since I was a kid anyway — I've never imagined in all that time that anything like this could exist. I've been a professional footballer for seven years now and I tell you I could play this 24 hours a day and never get tired of it. I'm not even sure it's a game at all. It could even be useful — to football managers! If Don Howe [Arsenal manager] took this home — or any other manager — I guarantee they'd do well on it. Their ideas would come out. The different things you can do ... like putting players up for sale ... it's incredible.

'The Highlight sequences are pure magic. And then you have to sit on the sidelines and sweat it out! Completely fantastic. I want one!"



SOCCER
(Thorn-EMI)
for the
ATARI 400/800
(£24.95)
ROM

Realism: 'Overall this is easily the most realistic display. You really feel totally involved with the game. I think it's absolutely superb.'

Graphics: 'Excellent. Faultless.'

Play action: 'By far the best of the five overall — I could easily spend 20 hours a day with this — so could anybody else I know. Fantastic — great stick response.' (NB: We used Suncom joysticks.)

FOOTBALL/SOCCER
(Atari)
for the
ATARI 2600 VCS
game system
(£19.99 or less)
ROM



Realism: 'I'd say this was more primitive, for young kids maybe? It was very fast — too fast. As soon as you lost the ball it was in the goal! The ball was never out of play! For that reason it was more low-par than the others I saw. You lost interest after a few minutes.'

Graphics: 'Again, pretty primitive really.'

Play action: 'Too fast. You'll never see real footballers leaping about like that. You can only control one player. Overall? Not bad, but I have to say, not as good as the others. Though I should say they're all far better than I'd ever expected.'

THE NICHOLAS LEAGUE

Division 1

1. FOOTBALL MANAGER (Addictive Software)
2. SOCCER (Thorn-EMI)
3. FOOTBALL (Vectrex)

Division 2

4. SOCCER (Intellivision)

Division 3

5. FOOTBALL (Atari)

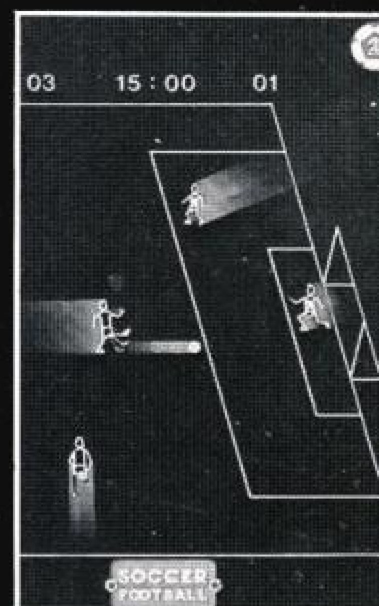


FOOTBALL
(Vectrex)
for the
VECTREX
game system
(£29.95 or less)
ROM'

Realism: 'Totally different, but very, very good all the same. A different system of graphics? You can see that. I loved the detail — the way when the ball went out of play the boy immediately went to get it. A nice touch — very realistic. This sort of thing gets you involved. You could play this for hours and never be bored with it . . . unless you don't like football.'

Graphics: 'At first all you see is a lot of lines — then they all flow together and you realise what's happening! Excellent.'

Play action: 'Weirdly enough, as good as the best one — the Thorn one. The speed everything happens is just right. It all flows together. 100% realistic.'







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TAKE THAT!!
BEANZ MEANZ PHEW!!
BEAN
HELP!
BILL SHOULDN'T BE TOO HARD TO FIND, KEEPING HIS STRENGTH UP, AS HE DID, BY EATING HUGE AMOUNTS OF BAKED BEANS. A CASE OF FOLLOWING ONE'S NOSE!
IF OUR HERO WAS IN NEED OF MORE EXCITEMENT HE COULD TRY FUN-PAC 2....
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OR PILOT STARSHIP SUPERNOVA
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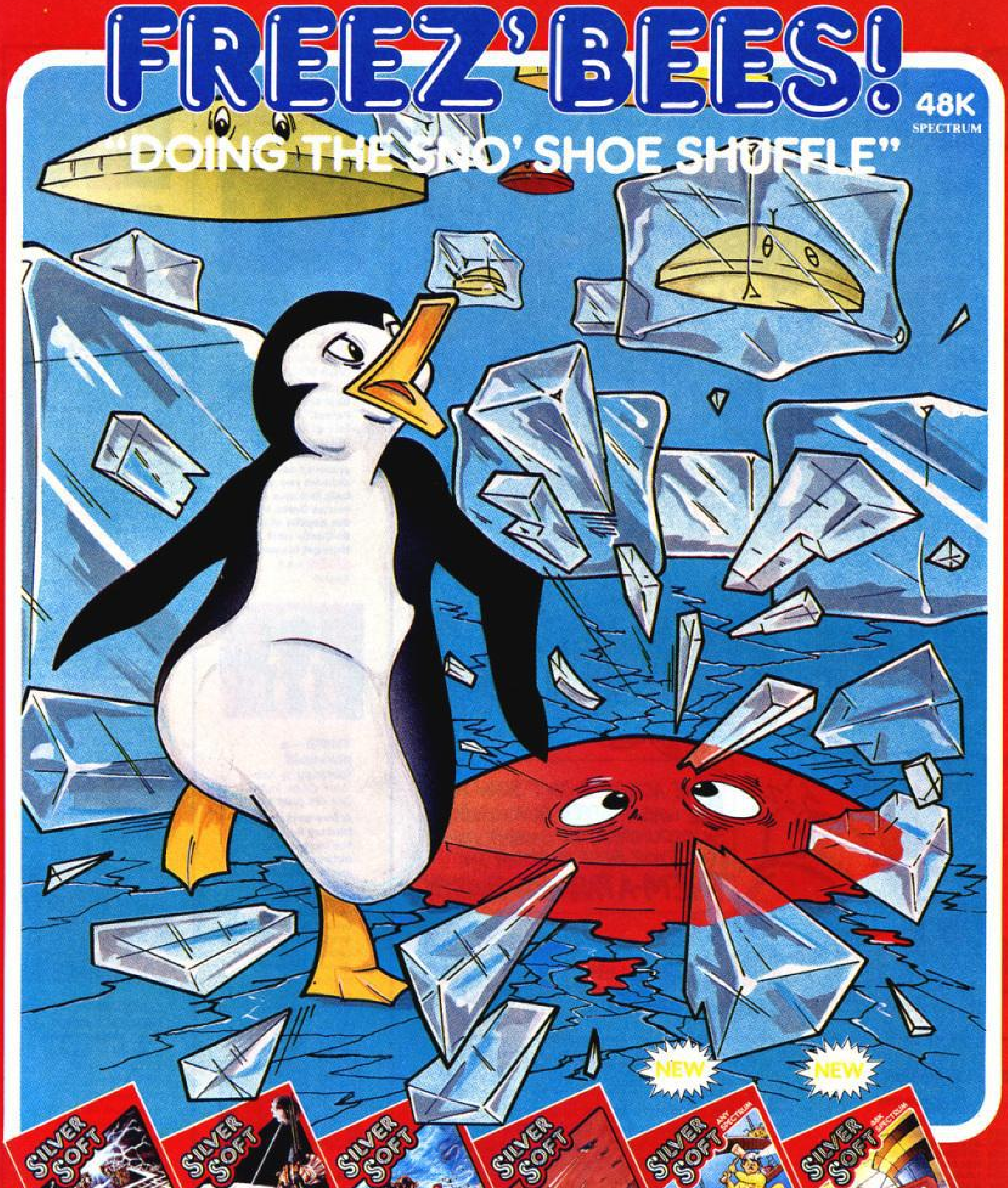
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GSH

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An interlinked series of adventures set in different time zones and on different planets

The date is 1236 T.A. That is to say, the one thousand, two hundred and thirty-sixth year of the Time After the rising Klartz, Lord of All Darkness. Little remains from the Time Before, except for a few isolated human colonies, scattered around the galaxy.

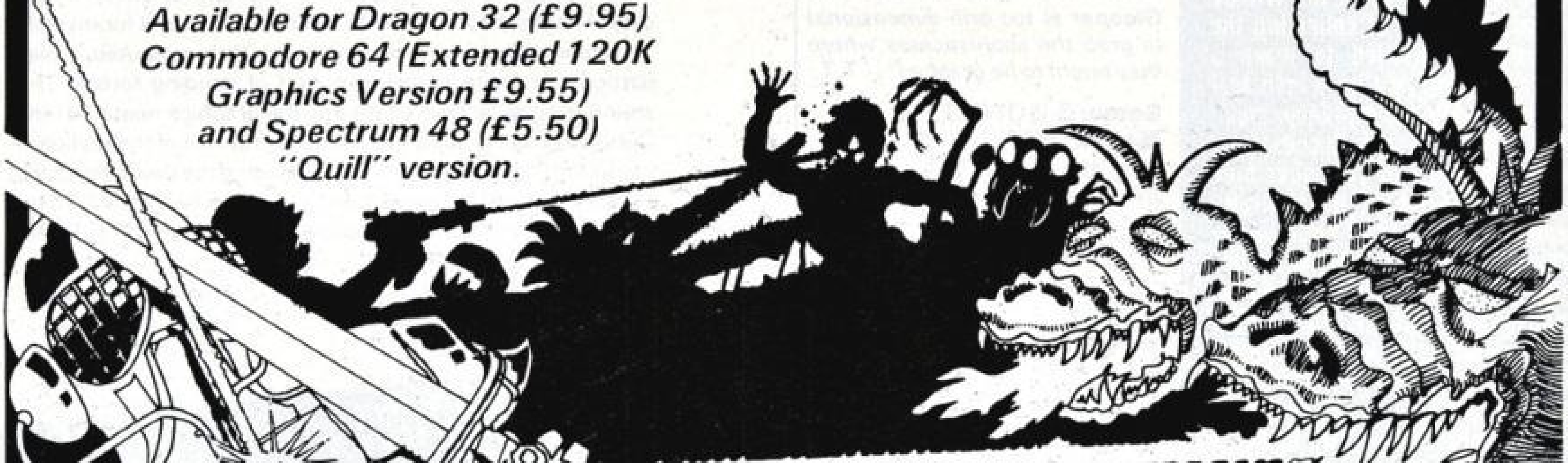
Legends tell of Klartz prowling the vast, empty reaches of space, sliding through the barriers of time at will. Descending, like the hideous parody of a Greek God, into some unsuspecting era of times past or futures to come, he would blend into the background while setting in train the most hideous acts of destruction.

You are a member of a small group of survivors dedicated to The Plan, to rid the Universe of Klartz and his Dark Forces. From the century-long study of The Plan library of timescans, it is clear that the power of Klartz can only be broken in one way. Relics of his many victims throughout time and space must be gathered together in a place unsullied by the Dark Forces. These relics, if sanctified by the Power of Light, would then radiate sufficient brilliance to counter and eliminate the Lord of All Darkness.

Your group has finally constructerd a tiny one-man Time Capsule, in which you will be projected to seek out and recover the relics.

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K	=	Could Be Better
KK	=	Could Be Worse
KKK	=	Unsurpassable



PASS THE SAUCE

You can just imagine it, can't you: "Hello, Ocean Software? This is Wimpy International. We think too many people are staying at home playing with their micros and not out buying tons of our burgers. Run off a quick game, would you, starring our lovable mascot, and sell it to them. They're bound to fall for our subtle advertising ploy and come flooding back!" Thus we have ***Mr Wimpy***, an eating experience over two screens that could put you off burgers for life. Your first task is to guide Mr Wimpy through the job of collecting the ingredients needed to make a burger, frustrated by a maniacal blob called Waldo who keeps stealing them from you. Successfully evade Waldo and you move onto screen two which is, naturally enough, a version of the ***Burger Time*** arcade game. Mr W dashes up and down ladders and across buns, meat, lettuce, etc., which drop down to make up complete burgers below. Antagonists in this section are Sid Sos, Pam Pickle and friends. Screen two makes a great game on its own and should have been accessed directly rather than having to go through the lacklustre screen one. Other features include: Joystick options, demo mode, high score and bonus time score. Machine code graphics are smooth and very good, sound is fine also. There are eight levels of difficulty in all. I think I'd prefer a double cheeseburger and a bag of soggy chips. — **R.B.**

Game: MR WIMPY
Maker: OCEAN SOFTWARE
Machine: SPECTRUM 48K
Format: cassette
Price: £5.90
Rating: KK

Not quite your Hampton Court

*Ever had a nightmare about being pursued down a brick-lined maze, with no way out and THINGS — nasty, huge, shapeless THINGS, hungry THINGS — just around each and every corner? No? You haven't lived. Supersoft's **3-D Glooper** (Commodore 64) evokes this ancient terror with all the unreal speed of the worst nightmares.*

In fact, it's another maze game — but this time from the inside out. That is, you ARE the dot-gobbler in person, and what you see, friend, is what you get.

*Joystick reaction is very fast, almost too fast — it would have been nice to insert a half-scroll frame between looking, say, straight ahead and the view to left, right or behind. As it is, you whirl like a dervish as you pursue the green dots on the pavement (who left THOSE there?) to infinity, never knowing when the Gloopers — big, furry blobs, quite lovable actually — are going to loom up and devour you. You are aided in the avoidance of same by a rather hard-to-follow radar screen; but my real complaint is that these cuddly-toy monsters (clones of the Dralon jobs that inhabit Sugar Puffs TV commercials) are just too easy to escape from. A swift haul-back on the stick and you retreat — that is, the Glooper retreats: backwards. Some penalty for failing to munch sufficient green dots against the clock might have made the beasties a little less easy to evade. Nice clear graphics, though, and good code, but despite the title, **3-D Glooper** is too one-dimensional to grab the sophisticates where they ought to be grabbed.* — **T.T.**

Game: 3-D GLOOPER
Maker: SUPERSOFT
Machine: COMMODORE 64
Format: cassette
Price: £5.95
Rating: KK





FUEL — WHAT A SCORCHER!

A compellingly original space fest that's probably easier to play than describe. Your starbase is under attack and evil Colonial forces are intent on your fuel cells. One by one (or three by three depending on which level you reach) they descend, accompanied by showers of Death Particles — which needless to say have to be avoided. What's worse, a Colonial Death Layer follows hot on their heels — if Colonial forces do indeed have heels — which rapidly cuts down your area of play.

Should an alien manage to avoid your laser fire and reach one of the fuel cells, he'll bounce back up through the Death Layer thereby transforming into a Superklone, who'll divide into two if hit by your blaster. As you might imagine, the pressure mounts up rather quickly. The thing continues until all of your blasters have been zapped or all your fuel cells lost. My average game lasted around 55 seconds. The accompanying manual tells me that should your score top the five-figure mark a supply ship will appear to top up your quota of fuel cells. I'll take that as read as I'm unlikely to see it for myself!

Cosmic Clones is a nice idea, stylishly executed. I was particularly taken with the notion of dividing forces. The sound is suitably discordant and the graphics neat and tidy. Curiously I had to abandon joysticks in favour of the keyboard as I found them far too sensitive. Avoiding the Death Particles calls for precise movement and the sticks had me whizzing around the lower portion of the screen like some gun-toting ice skater. Most undignified. — **S.K.**

Game: COSMIC CLONES
Maker: DRAGON DATA
Machine: DRAGON 32
Format: cassette
Price: £7.95
Rating: KKK

Space Invaders has become, over the years, not so much an old favourite as an old chestnut. So you've got to have a pretty brilliant version if you still want to cut any ice. An indifferent adaptation like this is of no interest to anyone.

There are three skill levels: 'Rookie', 'Master' and 'Expert' — but only the latter offers any sort of acceptable speed and even then you could sit playing it for hours. The unstoppable menace which made the original such a hit has gone to lunch and there's nothing in its place. Only the sound, namely a hesitant rendition of the *Star Wars* march is vaguely commendable.

Spend the cash on something else. — **S.K.**

Game: SPACE RAIDERS
Maker: MICRODEAL
Machine: DRAGON 32
Format: cassette
Price: £8.00
Rating: None

The Rediffusion 747 F.Sim is the world's largest, costliest and most realistic computer game. PAUL WALTON flew it anyway.



ROMEO FOXTROT, BREAK LEFT....TOO

WE WERE doing something in the order of 500 knots as our 747's nosewheel sank into the tarmac of Hong Kong's island airport . . . which was bad news for us, and, one might guess, for Hong Kong airport.

A huge lurch and a terrific thump — that was all we knew about it.

Then silence.

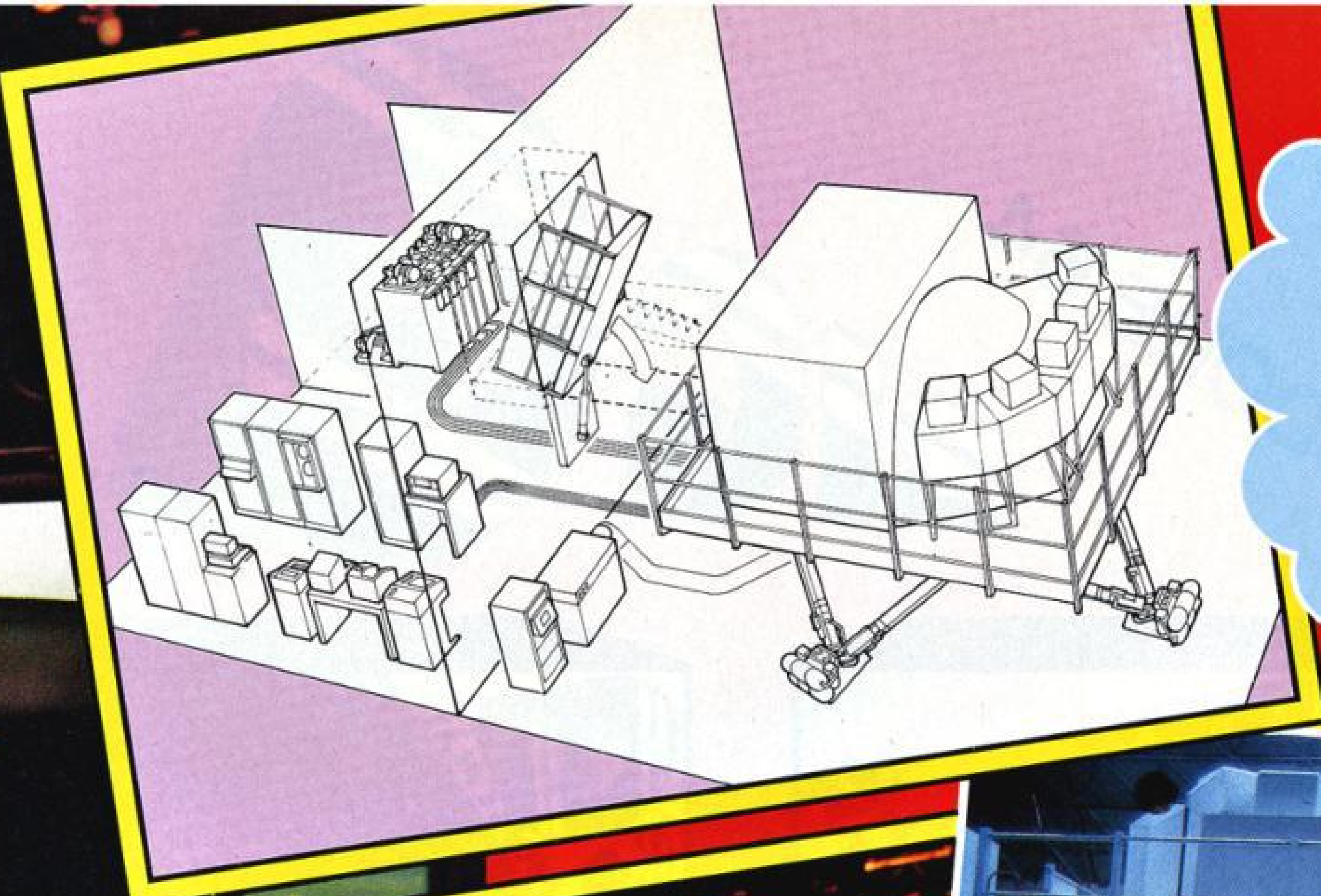
Then we got up and walked away.

Flight Simulation (F. Sim to those in the know) stretches realism to the humanly acceptable limits. Sophisticated computer systems coupled with advanced hydraulics make it possible to reproduce almost any sensation. "We're working on the smoke and flames, too, as you can see. We feel we can do everything else," said my somewhat-shaken co-pilot.

Jim Dann, otherwise a modest and witty systems engineer, can play God at the F. Sim installation he manages for Rediffusion in Crawley, just south of London.

"I don't feel Atari represents any serious competition to us — not just at the moment anyway." — I had dared to compare his F. Sim to a computer game. True, a catastrophic crash in River Raid was never so realistic as the demise of that (thankfully unreal) 747 flight into Hong Kong. But how long will it really be before this ultimate video game is open to the public? Sooner than you think . . .

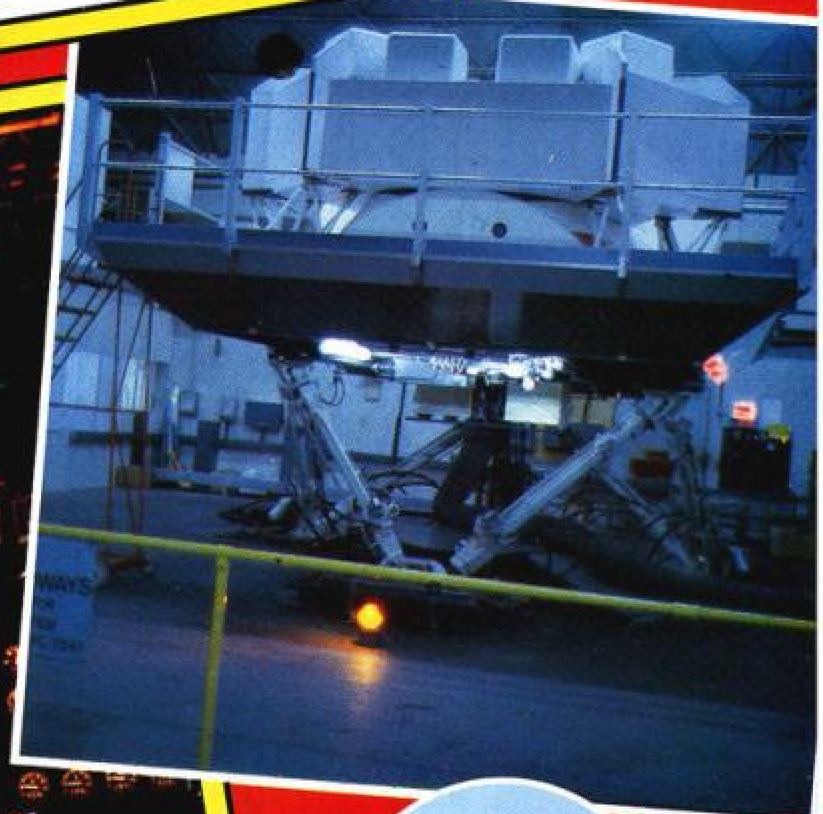
Last month saw Rediffusion unveiling its first space shuttle. More precisely, it was showing off the first commercial simulator craft capable of transporting forty to sixty people through any experience they might care to want or ever be able to afford. We were therefore more than delighted to be given an exclusive tour around the plant and actually inside some of the most advanced



Line drawing of Rediffusion's Flight Simulator. Enormously powerful hydraulics tilt and roll the cabin in any axis, so adding realism to the trainee's experience and testing his responses to emergency procedures. Heavy landings can even be bad for your back!







Left: a night landing, properly done. Touchdown is seconds away. Above: The Beast inside its purpose-built hanger: Ten million bucks'-worth of heavy metal.

simulators which will be bringing these giant experi(ence-)games to a wider audience.

WAR OF THE WORLDS

CORDONED OFF in a hundred square yards of factory floor — for our protection! — the 747 simulator we were to "fly" looked harmless enough until it began quite literally to take off. That is, it tilted and went upwards. A 747 passing through (simulated) turbulence must be very close to H. G. Wells' version of long-legged Martian monsters on the rampage.

The simulator's real-time "motion" is supplied by six sets of immensely powerful yet very sensitive pistons. These "super enhanced bulldozer jacks" carry an entire 747 flight cabin four or five feet into the air, shaking the 3-tonne, lorry-sized load around like a rag doll.

Towering some thirty feet over our heads, the 747's nose cone first reared up for a few seconds; then it stopped dead; and then the entire cabin tipped sharply over to the left away from us, stopping just as suddenly to hold the attitude.

"They've just taken off and made a pretty long bank to their left, probably to avoid the mountains on the way out of Hong Kong airport. They'll now be cruising at about 550 knots out over the South China Sea," explained Jim Dann — a man who obviously relishes the illusions his simulators can create and rejoices in their effect.

INSIDE THE BEAST

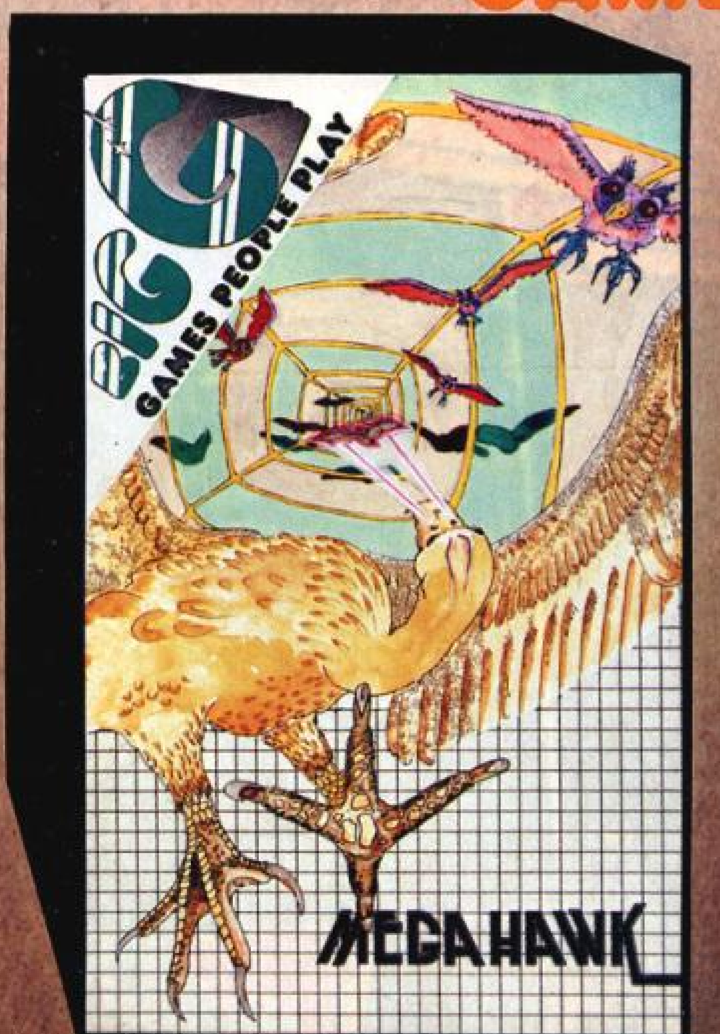
YOU KNOW when you're inside a 747 flight cabin. Distinctive sights and sounds assail the senses. These environmental changes easily fool gullible grey matter —

Continued on page 53

for the COMMODORE 64

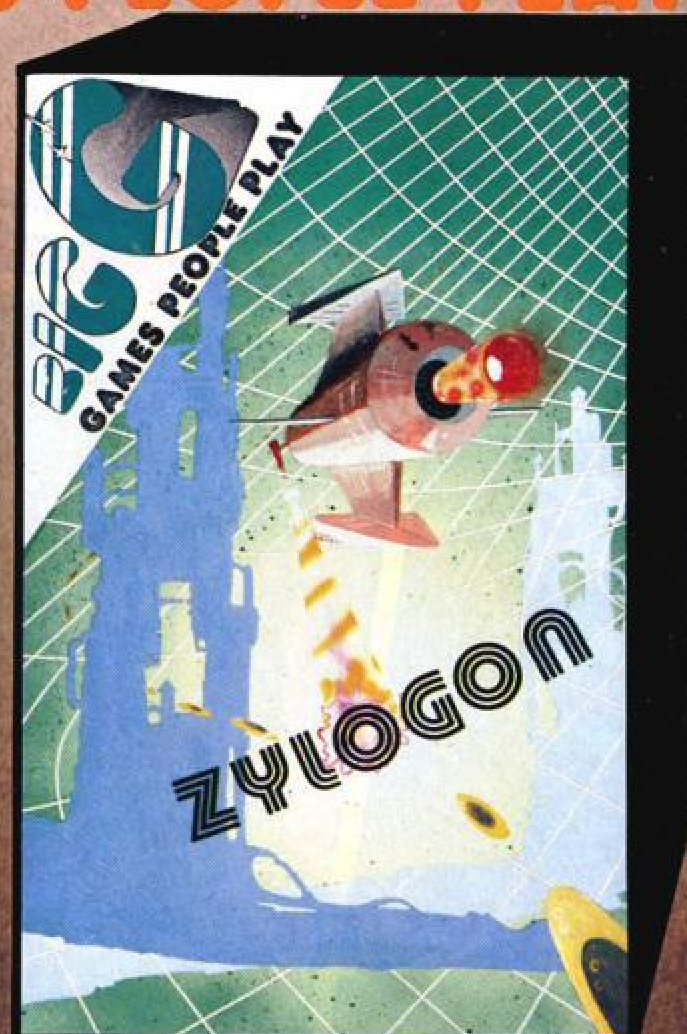
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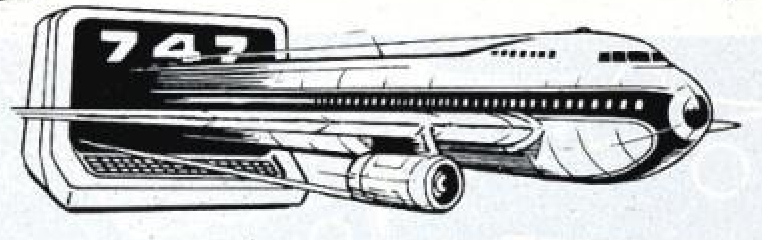
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they can even fool the strongest stomach into air-sickness.

Having climbed up the ladder and clambered into the 'driving seat', an intelligent human being ought to remember that it's just a hyper-realistic video game. Not so. This video game is played so realistically that, after only a few minutes, you're taking it as seriously as anything in your life before. It *is* real.

"Not like a VIC-20 is it?" smirks co-pilot Bob Soper. He has the job of maintaining Rediffusion F. Sims around the world.

While the mock-up 747 flight cabin is impressive — right down to small details like the oxygen masks and parachutes which we (hopefully) won't need — it is the view forwards out of the two main windows which most impresses. Take a look, though, at either extremity — and the simulated view disappears smoothly to leave a grey back-cloth at the very edge of the windows . . .

The next thing to notice is how the muted roar of the engines increases in volume and pitch as Soper turns them on, and how the airflow begins to whistle as we begin to "taxi" down the "runway". "Pre-recorded sound," says Soper, watching the throttles and gauges.

We are about to take off from Hong Kong airport at night and the sights are unbelievable — well, no, that's the point — they *are* believable. Customers can choose between day or night-time flying, but we can also select any one of the world's 47 most popular airports to "fly to".

The official term for this type of 3-dimensional aviation computer-model is Ground Station, but the pilots call them "plays". Bob Soper was keen to point out that while F. Sim is clever (it is actually sold under the rather unimaginative label SB, or Simulator Booth), it isn't used to train novices.

Even at £5,000,000 apiece, an aircraft simulator is a cheaper means of polishing pilots and cabin crew than the real thing — given the enormous costs involved in a single takeoff and landing. On this simulated 747, flight crew of any airline can gain valuable experience of all these major international airports without ever leaving the ground. So *this* video game makes money.

MY EYES, EARS AND STOMACH DECEIVE ME . . .

LOOKING DIRECTLY ahead you see a runway, illuminated exactly as it would be at night. On either side of us are the lights of Hong Kong, blocks of offices and flats. Thousands of them (what a lot of people!). These points of light disappear into the middle distance as the high-rises climb the steep mountains of Kowloon and the New Territories at the end of the runway.

We gather speed along the runway. The lights come towards us — and then flash past the edges of the windows. The grey/brown mass of the mountain grows rapidly to fill almost the entire window, the runway lights disappear and then . . .

Rotate!

We *could* fly straight through the "buildings" with only the slightest shudder, but collision with that mountain would most definitely bring on a "crash".

That strange thump which hits the pit of your stomach when taking off on a plane, not unlike swallowing a cannonball, is faithfully reproduced (how?). In the flight cabin all attention is focussed on the twin screens. The characteristic 'G' (or gravitational) forces "experienced" whilst flying are really just illusions. The simulator is really just lifting its nose in the air, or banking to left or right. It's not going anywhere.

Is it?

With my eyes on the runway, and the mountain ahead, we experience that sharp upward tilt of the aircraft with all the sensations of a real take-off. You "feel" the motion, your other senses register the ascent, and, to top it all, the aircraft then speaks to you! Shades of Maestro!

Every 747 has a limited — but useful — vocabulary of a dozen or so phrases, along with sundry bleeps, whoo-ahs, farts and urgghs. Just seconds after take-off our own verbal accompaniment shouts: "Tilt Rate" some five times, makes various noises, shouts "Pull-up" with metallic urgency — and then lapses into a long recital of the rather nagging "Wide Slope" for what seems like minutes.

Bob Soper explains that these phrases tell the pilot only the most important details — those likely to result in some catastrophe!

What *else* does it know?

From the sublime to the . . . less sublime.

How much commercial software matches up to Rediffusion's Simulator? Microdeal's Air Traffic Controller is one contender. ANDY GREEN reviews . . .



MICRODEAL, a British company operating from St. Austell in Cornwall, have recently brought out an *Air Traffic Controller* game for several different micros, all claiming high resolution graphics and other exciting features.

Microdeal also market a similar program, *Space Shuttle Simulator*. Microdeal sell the program on tape or disc, and although I got the tape version for review it loaded with no errors first time. It's &2E blocks long.

After a pause, a little title screen comes up in Mode 5. I guess a title screen sets the trend for a whole game, really. It's one of those little things that doesn't add to the enjoyment of the game, but can give it a professional feel right from the start. Oh dear, Microdeal.

It was at this point that a sudden suspicion crept into my mind, but I immediately dismissed the idea. No, they wouldn't have written a game that relies almost solely on smooth, quick movement in . . . in BASIC — would they? Of course not.

The program then wanted to know if we were using the keyboard or the joysticks — a point in its favour — then moved on, after a five-second pause, to the main game frame. It was at this point that the awful truth reared its ugly head. Little two-triangle aeroplanes flicked slowly from pixel to pixel in black and white.

Pressing CTRL-BREAK and OLD revealed 10K of BASIC controlling events.

I for one expect to find a well written, adequate fast game in the box when I part with my money, like those of Acornsoft, Program Power and Superior Software, to mention only a few. Programs like *Killer Gorilla*, *Q*bert* and *Planetoids*, machine-coded and beautifully written, are really worth the money. Games such as this one you'd expect to see in the listings section of BIG K — after all, it is totally in BASIC!

To be fair, though, it also has 'landing' and 'take-off' screens, but these are in much the same vein as the first. You just alternate between the two screens until all of the five machines you started off with are crashed. A major fault in the program design is that these 'planes', weighing 'tons' each, have no inertia! They do 180 degree turns at massive speeds on a pinhead!

When all the planes under your control have finally done their Pope impersonations on the tarmac, you're treated with another badly-laid out high-score screen, and asked if you want another go. If you say no, the program prints up endless triangles in different colours (the programer probably thought this would have 'em spellbound) until you hit 'escape'.

In conclusion, if this is the state of the art in BBC flight simulator-type games, then forget it for now. Alas. Although it seems like a good idea, the implementation of this particular product has not come off very well.

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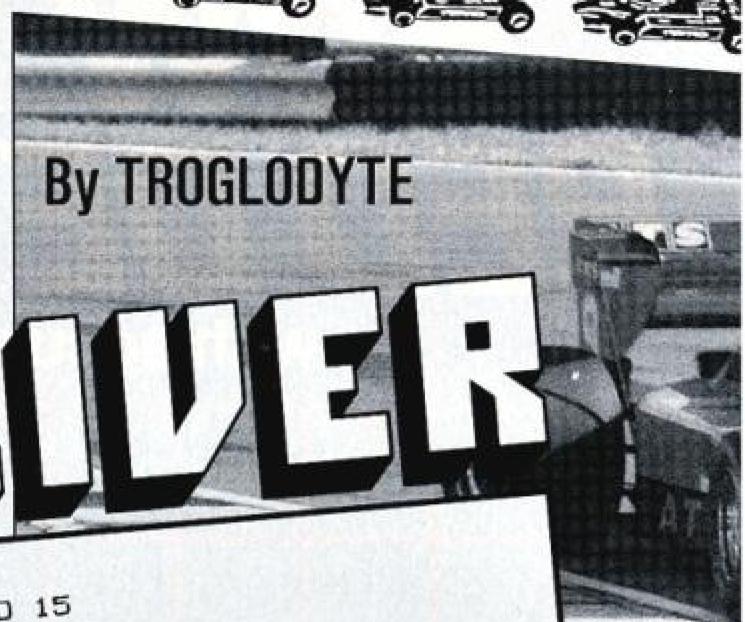
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By TROGLODYTE



DEMON DRIVER

```
10 REM DEMON DRIVER
20 REM WRITTEN BY MARK & FRANCES (MJA &
FMA 4E4)
30 REM INITIALISE HIGH SCORE
40 LET H=10:LET A$="TROGLODYTE"
50 CLS
60 PRINT@234,"DEMON-DRIVER"
70 PRINT@297,"(C) TROGLODYTE"
80 FOR N=1 TO 500:NEXT N
90 FOR N=1 TO 300:SCREEN0,0:SCREEN
0,1:NEXT N
100 FOR N=1 TO 1000:NEXT N
110 CLS
120 PRINT:PRINT" THE OBJECT OF THIS GAME
IS TO CONTROL YOUR CAR, A ''' ALONG THE
ROAD, TRAVELLING AS FAR AS POSSIBLE
WITHIN THE TIME LIMIT OF TWO MINUTES."
130 PRINT:PRINT" control IS BY
THEright-HAND","JOYSTICK.YOU CAN CONTROL
YOUR","LATERAL POSITION BY MOVING
THE","JOYSTICK LEFT AND RIGHT, AND YOUR
SPEED BY PRESSING THE fire","BUTTON.IF
YOU PRESS THIS BUTTON,YOU WILL TRAVEL
FASTER."
140 LET B$=INKEY$
150 PRINT"good luck",,,,"press any key
to continue";
160 SCREEN0,1
170 FOR N=1 TO 500
210 IF INKEY$<>"" THEN 230 ELSE NEXT N
220 GOTO 160
230 CLS
240 INPUT "ROAD WIDTH (3_9)";W
250 IF W<3 OR W>9 OR W<>INT(W) THEN 230
260 PRINT:PRINT"HOW FAR DO YOU WANT TO
SEE?"
270 PRINT" (5_15)"
280 INPUT F
290 IF F<5 OR F>15 OR F<>INT(F) THEN 270
300 LET F=16-F
310 D=0
320 G=16-W/2
330 LET X=1023+G+F*32+W/2
340 REM DRAW START OF ROAD
350 CLS
360 FOR N=F TO 15
370
PRINT@(N*32+G),STRING$(W,CHR$(191));380
LET A=RND(3)-2
390 IF G+A<1 OR A+G>30 THEN 410
400 LET G=G+A
410 NEXT N
420 POKE X,35
430 REM WAIT FOR PLAYER TO PRESS FIRE
BUTTON
440 FOR N=0 TO 15
450 READ B$
460 PRINT@(N*32),B$;
470 NEXT N
480 DATA p,u,s,h, ,f,i,r,e,,b,u,t,t,o,
n
490 IF PEEK(65280)<>126 AND PEEK(65280)
<>254 THEN 490
500 RESTORE
510 FOR N=0 TO 15: PRINT@(N*32),"";:NE
XT N
520 FOR N=0 TO 9:PRINT@(N*32),RIGHT$(ST
R$(N),1);:NEXT
530 FOR N=9 TO 0 STEP -1:PRINT@(N*32),"
*";:SOUND 255/(N+9),1:PRINT@(N*32),"";
:NEXT N
540 REM START TIMER
550 TIMER=0
560 REM START OF LOOP
570 POKE X,35
580 IF JOYSTK(0)>48 THEN X=X+1
590 IF JOYSTK(0),16 THEN X=X-1
600 IF PEEK(65280)=126
ORPEEK(65280)=254THEN POKE 65495,0 ELSE
POKE 65494,0
610 LET A=RND(5)-3
620 IF G+A<1 OR G+A+W>31 THEN 640
630 LET G=G+A
640 PRINT@((480+G),STRING$(W,CHR$(191))
650 D=D+1
660 IF TIMER>6000 THEN 780
670 IF PEEK(X)=191 THEN 570
680 REM HIT OBSTACLE
690 IF PEEK(X)=96 THEN 700
700 REM CRASHED,PEEK(X)=96
710 FOR N=1 TO 100: SCREEN0,0:SCREEN0,1
:NEXT N
720 SOUND 1,4
30 FOR N=1 TO 20:POKE X,153: POKE X,185
:POKE X,150: POKE X,182:NEXT N
740 POKE X,159
750 FOR N=1 TO 500:NEXT N
760 CLS
770 GOTO 970
780 REM COURSE COMPLETED
790 LET C$="congratulations"
800 CLS0
810 FOR N=1 TO 7
820 PLAY "T7V1004B"
830 PRINT@(231+N),MID$(C$,N,1);
840 PLAY "G"
850 PRINT@(247-N),MID$(C$,16-N,1);
860 NEXT N
```



TRIED & TESTED BIG K GAMES

RUNS ON DRAGON 32

```
870 PRINT@239,"u";
880 PLAY "O5T15BGBGBGBGBGBGBGBG"
890 FOR N=1 TO 1000: NEXT N
900 IF D.H THEN 1130
910 GOSUB 1010
920 CLS
930 PRINT:PRINT"CONGRATULATIONS YOU COMPLETEDTHE COURSE.HOWEVER YOU DID NOT BEAT THE PREVIOUSHIGH SCORE."
940 PRINT: PRINT"press any key"
950 IF INKEY$="" THEN 950
960 GOTO 1190
970 REM ALL ROUTINES COME HERE
980 REM HIGH SCORE ROUTINE
990 IF D<H THEN 1190
1000 GOTO 1190
1010 CLS0
1020 PLAY "T7O2V10BBBB"
1030 PRINT@232,"congratulations"
1040 FOR M=1 TO 10
1050 FOR N=1 TO 100:NEXT N
1060 SCREEN0,0
1070 FOR N=1 TO 100:NEXT N
1080 SCREEN0,1
1090 NEXT M
1100 FOR N=1 TO 1000:NEXT N
1110 RETURN
1120 REM INPUT NAME
1130 GOSUB 1010
1140 CLS
1150 PRINT: PRINT"YOU HAVE BEATEN THE PREVIOUS","HIGH SCORE OF";H*5;"METRES BY",A$;" WITH A DISTANCE OF", D*5; "METRES.":PRINT
1160 INPUT"TYPE IN YOUR NAME";A$
1170 LET H=D
1180 GOTO 1220
```

```
1190 PRINT:PRINT"YOU TRAVELLED"; D*5; " METRES."
1200 PRINT:PRINT"THE HIGH SCORE IS":H+5
1210 PRINT:PRINT"HELD BY ";A$
1220 PRINT:PRINT"press any key"
1230 SCREEN0,0:FOR N=1 TO 500
1270 IF INKEY$<>"" THEN 50
1280 NEXT N
1290 GOTO 1230
```

PROGRAM NOTES

Type the listing in exactly as shown and follow displayed game instructions. Some Dragons will not recognise the POKE 65495,0 command (line 600), and as a result use of the fire button will cause the game to stop. To cancel this effect, first save the game after typing, then DELETE line 600 before running. You're off!



SAVE

It's no big deal, really . . . just an alien UFO on its way to level your city. You only have one tank with AA capability to defend your urban airspace, so for once you can blaze away in a good cause. Get blazing!

```
PROGRAM:  TANKY

 5 OF=30720:VA=9*16↑3+14:VN=VA-1
 8 POKE VA+1,190
 9 PRINT"[BLACK,CLEAR,DOWN28,RVOFF]
                          [LEFT,INST]

   [HOME]"
 20 PRINT"[HOME,RVS]** TANK VERSUS UFO
   . **"
 21 PRINT"[HOME,DOWN,RVS]
    USE JOYSTICK TO MOVE "
 100 PRINT"[HOME,DOWN18]"
 101 FOR A=38400 TO 38400+22*23
    :POKE A,0:NEXT:A=0
 105 PRINT"    |"
 110 PRINT" _[RVS]  [RVOFF]_"
 115 PRINT" Doool "
 120 PRINT"[UP3]";
 125 GOSUB 8000: IF JO AND 16 THEN GOS
    UB 300:A=A+2:GOTO 220
 130 IF JO AND 4 THEN GOSUB 300:A=A-2
    :GOTO 220
 135 IF(JO AND 9)AND B=0 THEN B=1
    :C=8079+A:P=15:L=1:FOKE VN,158
    :POKE C,160:POKE C+OF,4:GOTO 170
 136 IF L=0 THEN 140
 137 POKE VA,P:F=P-1:IF P=-1 THEN L=0
    :POKE VN,0
 140 IF B=0 THEN 170
 141 FOR H=1 TO 3:POKE C,32:C=C-22
 150 IF PEEK(C)=60 OR PEEK(C)=42 OR PE
    EK(C)=62 THEN 600
 155 IF C<7746 THEN B=0:GOTO 170
 160 POKE C,46
 161 NEXT
 170 IF D=0 THEN 800
 172 IF D=0 THEN 180
 173 IF E<7682+110 THEN POKE E-2,32
    :POKE E,32:FOKE E-1,32:GOTO 800
 174 POKE E,32:FOKE E-1,32:FOKE E-2,32
    :K=K+1
 176 IF E=I THEN D=0:GOTO 180
 178 E=E+J:POKE E,62:POKE E-1,42
    :POKE E-2,60
 179 IF J=1 THEN 182
 180 IF INT((8186-E)/22)=22-K-A AND F=
    0 THEN F=1:G=E+21:M=21:GOTO 183
 181 GOTO 183
 182 IF INT((8098-E)/22)=A-K AND F=0 T
    HEN F=1:G=E+23:M=23
 183 IF F=0 THEN 125
 184 POKE G,32:G=G+M
 186 IF PEEK(G)<>32 THEN 700
 187 IF G>7680+22*21 THEN F=0:GOTO 500
 189 POKE G,81:GOTO 125
 220 IF A<0 THEN A=0
 221 IF A>15 THEN A=15
 222 PRINT TAB(A)"    | "
 225 PRINT TAB(A)" _[RVS]  [RVOFF]_"
 230 PRINT TAB(A)" Doool "
 235 PRINT"[UP3]";:GOTO 135
 300 PRINT TAB(A)"       "
 305 FRINT TAB(A)"       "
 310 PRINT TAB(A)"       "
 315 PRINT"[UP3]";:RETURN
 500 POKE G,66:FOKE G+1,78:POKE G-1,77
    :POKE G-20,46:POKE G-21,46
    :POKE G-22,46
 510 POKE G-23,46:POKE G-24,46
 520 FOR AA=1 TO 100:NEXT
 530 POKE G,32:POKE G+1,32:FOKE G-1,32
    :POKE G-20,32:POKE G-21,32
    :POKE G-22,32
 540 POKE G-23,32:POKE G-24,32
 590 GOTO 125
 600 POKE C,160:POKE C+1,160
    :POKE C-1,160:POKE C+22,160
    :POKE C-22,160
 601 L=0
 610 POKE VN,128+100
 611 FOR GG=15 TO 0 STEP-1:FOKE VA,GG
    :FOR GH=1 TO 70:NEXT:NEXT
 615 B=0:D=0
 616 POKE C,32 :POKE C+1,32
    :POKE C-1,32 :POKE C+22,32
    :POKE C-22,32
 617 POKE C-2,32:POKE C+2,32
    :POKE C-3,32:POKE C+3,32
 640 E=E+22+J:POKE VA,15:FOKE VN,0
 645 POKE E,62:POKE E-1,42:FOKE E-2,60
 646 FOR O=248 TO 253:FOKE VN-1,O NEXT
    :FOR O=253 TO 248 STEP-1
    :POKE VN-1,O:NEXT
 647 POKE E,32:POKE E-1,32:POKE E-2,32
 650 IF E<7680+20*22 THEN 640
```

THE CITY!

FOR COMMODORE 64

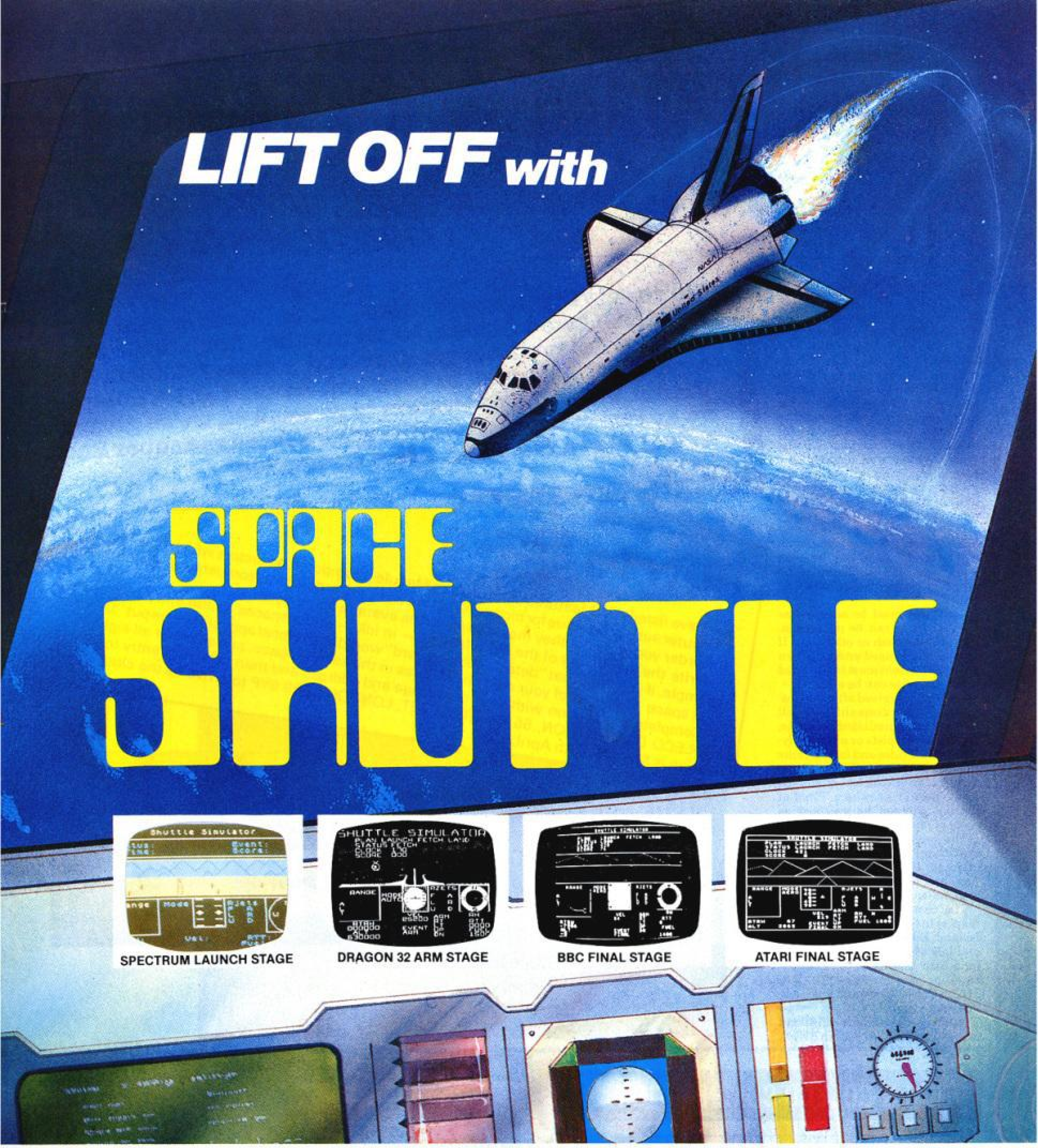
by D. LATER and E. BLARE

ILLUSTRATION: DAVID HINE



```
651 E=E+J
652 POKE E+22,62:POKE E+21,42
    :POKE E+20,60:POKE E+OF,4
    :POKE E+OF-1,4:FOKE E+OF-2,4
653 POKE E+22+OF,0:FOKE E+21+OF,0
    :POKE E+20+OF,32
654 POKE VN-1,0:FOKE VN,128
    :FOR Q=1 TO 20:POKE VA,
    15-INT(Q/1.33)
655 FOKE E,223:POKE E-1,223
    :FOKE E-2,223:FOR O=1 TO 20:NEXT
656 POKE E,233:POKE E-1,233
    :FOKE E-2,233:FOR O=1 TO 20:NEXT
657 NEXT:POKE E,32:FOKE E-1,32
    :POKE E-2,32:POKE E+22,32
    :FOKE E+21,32:POKE E+20,32
658 PRINT"[YELLOW,HOME,DOWN2]
659 DT=DT+1:GOSUB 900
660 GOTO 125
700 POKE VN,128:L=0
701 A=A+1:FOR KL=1 TO 20
    :POKE VA,15-INT(KL/1.3):
704 PRINT TAB(A)"[RVS,MAGENTA]FFFF"
705 PRINT TAB(A)"[RVS]          "
715 PRINT"[UP2]";
720 PRINT TAB(A)"[RVS,MAGENTA]▼▼▼▼"
725 PRINT TAB(A)"[RVS]          "
```

```
735 PRINT"[UP2]";
740 NEXT
745 PRINT TAB(A)"          "
750 PRINT TAB(A)"          [GREEN]"
751 PRINT TAB(A-1)"          "
752 PRINT"[UP3]";
756 PRINT"[YELLOW,HOME,DOWN3]          "
757 DU=DU+1:GOSUB 900
760 F=0:A=0:GOTO 105
800 D=1:E=7702+INT(RND(1)*14)*22+88
    :I=E-20:K=0:J=-1:IF RND(1)>.5 THEN
    E=E-21:I=E+20
805 GOTO 172
900 PRINT MID$("[BLACK,RED,CYAN,
    MAGENTA,GREEN,BLUE,YELLOW]",
    RND(1)*7+1,1);
910 PRINT"[RVS,HOME,DOWN2]UFO
    :"DU"[RVOFF]  [RVS]TANK:"DT
    :PRINT"[DOWN15]"
920 RETURN
8000 REM READ JOYSTICK
8010 POKE 37154,127
8020 JO=(NOT((PEEK(37152)AND 128)/8+(
    PEEK(37151)AND 60)/4))+32
8030 POKE 37154,255
8040 RETURN
```



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WIN A COLECO

...IN OUR SNAZZY, TOTALLY FREE-TO-ENTER COMP

We're giving away ColecoVision Module 3's this month — two of them, to be precise. Each with 80K RAM, a daisywheel printer and a classy detachable keyboard. And just in case you haven't got a ColecoVision Video Game System to go with it, we're giving away two of those as well — with a third as a super 2nd Prize! Plus a Module 1 Atari Converter!

RULES

There is no entry fee but all entries must be on a proper printed coupon cut from BIG K and must bear the entrant's own name, age and address.

Every accepted entry will be examined and the First Prizes awarded to the two entrants who, in the opinion of the judges, have shown the most skill and judgment in placing the listed factors in the order of appeal to an average home user. Remaining prizes will be awarded for the next best entries in order of merit. No entrant may win more than one award.

In the event of a tie or ties for any prize(s) then a further test of skill will be conducted by post between tying competitors to determine the eventual winner(s) or winning order.

All prizes must be accepted as offered. There can be no alternative awards, cash or otherwise. If any winner is aged under 18 then parental consent must be provided before the prize can be awarded.

Any entry received after the closing date will be disqualified as will any received mutilated, illegible, altered, incomplete or not complying with the rules and instructions exactly. No responsibility can be accepted for entries lost or delayed in the post or elsewhere. Proof of posting will not be accepted as proof of receipt.

The judges' decision and that of the Editor in all other matters affecting the competition will be final and legally binding. No correspondence can be entered into.

The competition is open to all readers in Great Britain, Northern Ireland, Eire, the Channel Islands and Isle of Man except employees (and their families) of IPC Magazines Ltd., the printers of BIG K or of CBS Colecovision and their publicity agents.

All winners will be notified and the result published later in BIG K.

HOW TO ENTER

We have listed eight features of the Coleco Module 3 computer, all factors which help make this computer such good value for money. What we want you to do for this competition is place them in the order you consider they most appeal to the average home user.

Write the key letters of the eight factors — in ink — in the spaces on the entry coupon. For example, if you think that "detachable keyboard" would be the most appealing then put "D" in the first space. The letter of your next choice goes in the second space, and so on for all eight.

Complete the coupon with your name, age and address and then post your entry to: BIG K COLECO COMPETITION, 55 EWER STREET, LONDON SE99 6YP to arrive by the closing date which is Monday 30th April, 1984.



HERE ARE THE FACTORS

- **A.** large existing software library
- **B.** outstanding graphics and sound
- **C.** daisy-wheel printer as standard
- **D.** detachable keyboard for easy use
- **E.** large memory — 80K RAM
- **J.** built-in word-processor
- **K.** expansion possibilities — networking, extra memory
- **L.** high volume data storage — microfloppy drive

BIG K COLECO COMPETITION

1	2	3	4	5	6	7	8

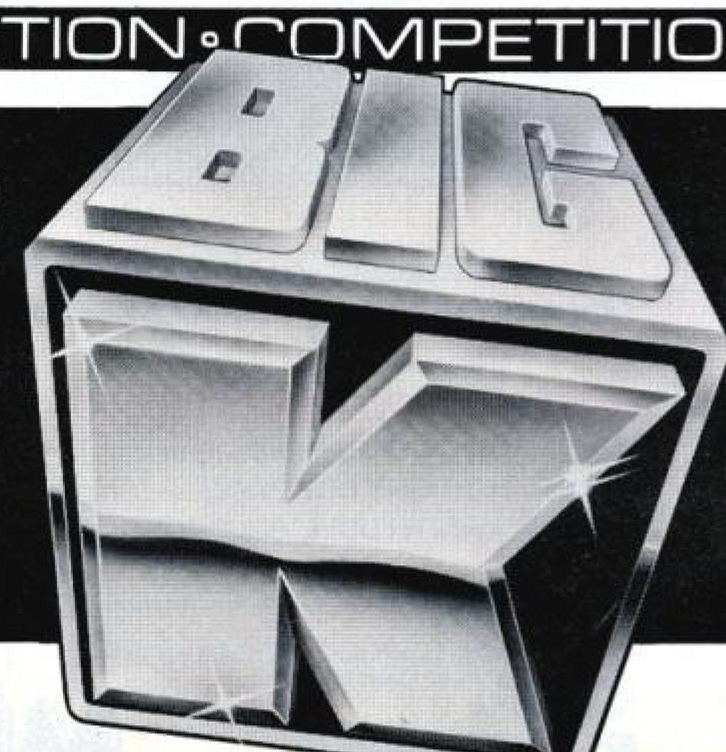
In entering this competition, I agree to abide by the rules and to accept the published result as final and legally binding.

NAME .... AGE ......
ADDRESS ....
....
....

PLEASE CUT NEATLY AROUND THIS LINE

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MODULE 3



The ColecoVision Module 3 is one peripheral that's about three times as big as its master component! Plugged into the Expansion Port of the Coleco Game System it brings you an instant 80K, plus a SmartWriter daisywheel printer, data storage and a sculptured detachable keyboard. Plus a built-in word processor! It uses a Z80A CPU, has six function keys and a numeric keypad. Best of all, you have instant access to any of CBS-Coleco's superb arcade-quality games, plus the pending range of ADAM software.

The ColecoVision Video Game System plus Module 1 Atari Converter combines the world's best games machine with the world's largest cart library. Bring true arcade power — dazzling graphics, brilliant sound — into your home!

SECOND PRIZE

is a superb ColecoVision Video Game System — giving you access to genuine arcade-quality games software.

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fantasy SOFTWARE

Bob Hamilton's best selling Spectrum game has been beautifully converted for the Commodore 64 by John White with many additional features fully utilising the extra capabilities of this machine. The Pyramid contains 120 chambers on 15 levels. In order to get from one chamber to another you must fight off the indigenous aliens to collect an energised crystal which will neutralize the force field guarding the two exits. The Pyramid is defended by a total of 120 different beautifully animated aliens (more than any other video game in history!), one for every chamber and each with a unique attack pattern. They manifest themselves in the most amazingly diverse and peculiar forms from the squirting soda syphons to the extra-terrestrial tweezers and a whole host of entities defying rational description. You will have great fun inventing your own nicknames.

You proceed to explore the Pyramid from top to bottom with the difficulty increasing with the depth of level as the attack patterns get more complex and the aliens become intelligent.

Depending on the choice of exit from each chamber you are likely to have a different game every time you play.

Apart from the challenge of trying to achieve the highest score possible the Pyramid contains a number puzzle to solve. The more chambers you successfully visit the more information is gathered to enable you to unravel the secret numbers of the Pyramid.





This is "ZIGGY". He is shown above in his exploratory capsule and is a true representation of the on screen graphics. You have total control over his movements as you explore the many chambers of "THE PYRAMID".

THE PYRAMID

For Commodore 64 and 48K Spectrum

FANTASY SOFTWARE is available from W.H. SMITHS, JOHN MENZIES, BOOTS, LASKYS, GREENS, RUMBELOWS, SPECTRUM GROUP and all other good software retailers.

The Pyramid at £6.50 for Commodore 64K and at £5.50 for the Spectrum 48K from

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Scarthax has scoured the Universe to bring together the six ancient stones of lifeforce. United in Doomsday Castle they are being used to wield an irresistable power over the cosmos, emanating waves of corruption through every galaxy.
To save the Universe, you must battle your way through the Castle to find and collect the six stones and use their force against Scarthax to destroy Doomsday Castle, hopefully escaping yourself before the final cataclysmic explosion. The task is not easy (saving the Universe never is!) and it will take youmany games to unfold the structure of Doomsday Castle and discover the locations of the ancient stones. The addictive arcade style action will keep you coming back to play but the overall challenge should still keep you occupied for months.
You take on the role of our super hero ZIGGY shown here above in his exploratory capsule in combat with an Urk disguised as a pangalactic gargleblaster (!!) This is a true representation of the on-screen graphics.
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WHEN THE ACCESS IS A LITTLE TOO RANDOM

Computer Crime is on the increase. Illegal hackers' activities range from harmless japes to royal rip-offs involving megaquantities of green and folding — and worse. JOHN MAY has been keeping tabs on the doings of the electronic muggers.



They call themselves freakers or pranksters. Their favourite "calling card" is to instruct the computer to divide 0 by -1, a task so difficult the computer locks out every other user. Security consultants label their activities Juvenile Computer Delinquency.

Ten years ago they would have been using blue boxes to tap into the telephone system, making transatlantic calls for 2p from a phonebox. Now they're exploding the world's computer networks just to test their skills. No system is safe. Some of their activities have become legendary. It has been going on for many years and the problem is getting worse.

A classic example occurred in October 1974 when a 15-year-old schoolboy broke into the security system of a major London computer time-sharing service and gained access to the most secret files. His only tools were the school's teletype terminal — and his ingenuity.

By trial and error he discovered that he could read the main memory and he then wrote a program to provide him with a print-out of the operating system. Using this and an obsolete systems manual, he got a complete list of account numbers. By eavesdropping on users when they used the system, he was able to learn passwords and to gain access to their data files.

After his explorations, he wrote to the computer company telling them what he had done. They never replied.

Another computer company — Control Data — have skilled technicians working in groups known as "Tiger Teams", who test ways of gaining access to secure programs. The news is they almost always find some new way in.

> **"The element of game playing is an almost universal characteristic of computer crime."**
> ***International Management***

Is education to blame? According to science correspondent Angus Macpherson: "Kids getting into computers to improve their recorded marks are so commonplace that some computer professors regularly fail all their students — those who are any good will get into the system and pass themselves."

At a West Germany university the situation developed to the point where it had become a game between departments to discover each other's passwords.

Most of this kind of activity is internal and low priority, with cases of students altering their marks by accessing archive files, or forming "crash clubs" to grainstorm their way into a Time Sharing service.

But in 1980 things went a little beyond that edge.

The location was the Dalton School on the East Coast, one of the most expensive ($4,440 a year) and exclusive private day schools in America. From the school computer centre four students dialled into a computer network called Telenet and from there gained access to some 20 Canadian companies and universities, including a cement manufacturer in Montreal.

They then plugged into Pepsi's Master File Directory and located the program that contained the shipping instructions for the whole of Canada. A few minor alterations later and a warehouse foreman in Toronto got a computer printout telling him to ship ten cases of Pepsi to such and such address.

> **"They tend to be young, highly motivated, energetic. They respond to the challenge of game playing."**
> **Donn B. Parker, US author of *Fighting Computer Crime***

Three of the students were 14 at the time and the ring-leader was 15.

As a result the US Attorney's office did not press charges. The Royal Canadian Mounted Police didn't prosecute because "it doesn't look good to extradite a minor." The school chose not to take disciplinary action to spare the publicity. The companies took a philosophical view. No names were made public.

Last June FBI investigators were called in on an even larger computer freak, operated by ten home computer buffs collectively known as the "4-1-4s", after the Milwaukee telephone area code. Before they were caught they gained access to 60 computers, including the Los Alamos nuclear weapons laboratory, a cement company in Canada (an interesting coincidence) and the Memorial Sloan-Kettering Cancer Centre in Manhattan.

They began by dialling a local telephone number to connect them to a leased telephone line operated by the GTE Telenet Communications Corporation of Vienna, Virginia, which provides access to 12,000 computers across the States for some 150,000 authorised users.

In some cases, like California's Security Pacific National Bank, they simply gained access by using a manufacturer's password which left them free to peruse loan accounts for Australia and Zaire.

Neal Patrick, the only 4-1-4 named in press accounts, used a Radio Shack computer and a modem. He dialed Telenet, typed C for "connect", then an area code, then a number from 1-200. His family



The entire US Defence establishment — plus Joshua, the computer — go bananas: from War Games

FOR YOUR JARGON FILE...

HACKERS, FREAKERS and PRANKSTERS. The polite names for people who break into somebody else's computer system.

PROGRAM ZAPPING. When a hacker destroys some of the software in the system he or she has just broken into.

PIGGY BACKING. This is when a communications line serving an authorised user is tapped into. The freaker may then borrow the user's password for access to a main computer.

TIME BOMB. Here the prankster plays around with the clock in a computer system, usually to activate the system at a later date — when the prankster is not about naturally.

LOGIC BOMB. Fairly similar to the Time Bomb except the hidden routines are triggered by a combination of events rather than the computer's clock.

solicitor arranged for immunity from prosecution for wire fraud and his parents didn't even make him pay the telephone bill he'd rung up.

If you recognise any details of this case at all, it was because it was linked up with the promotion of *War Games*, highlighted as a copycat crime because of the Los Alamos connection.

In fact a much closer parallel happened in November last year when Ronald Mark Austin, 19, a student at the University of California in Los Angeles and a self-taught computer operator, was arrested and charged with using his home computer to tap into US Department of Defense computers.

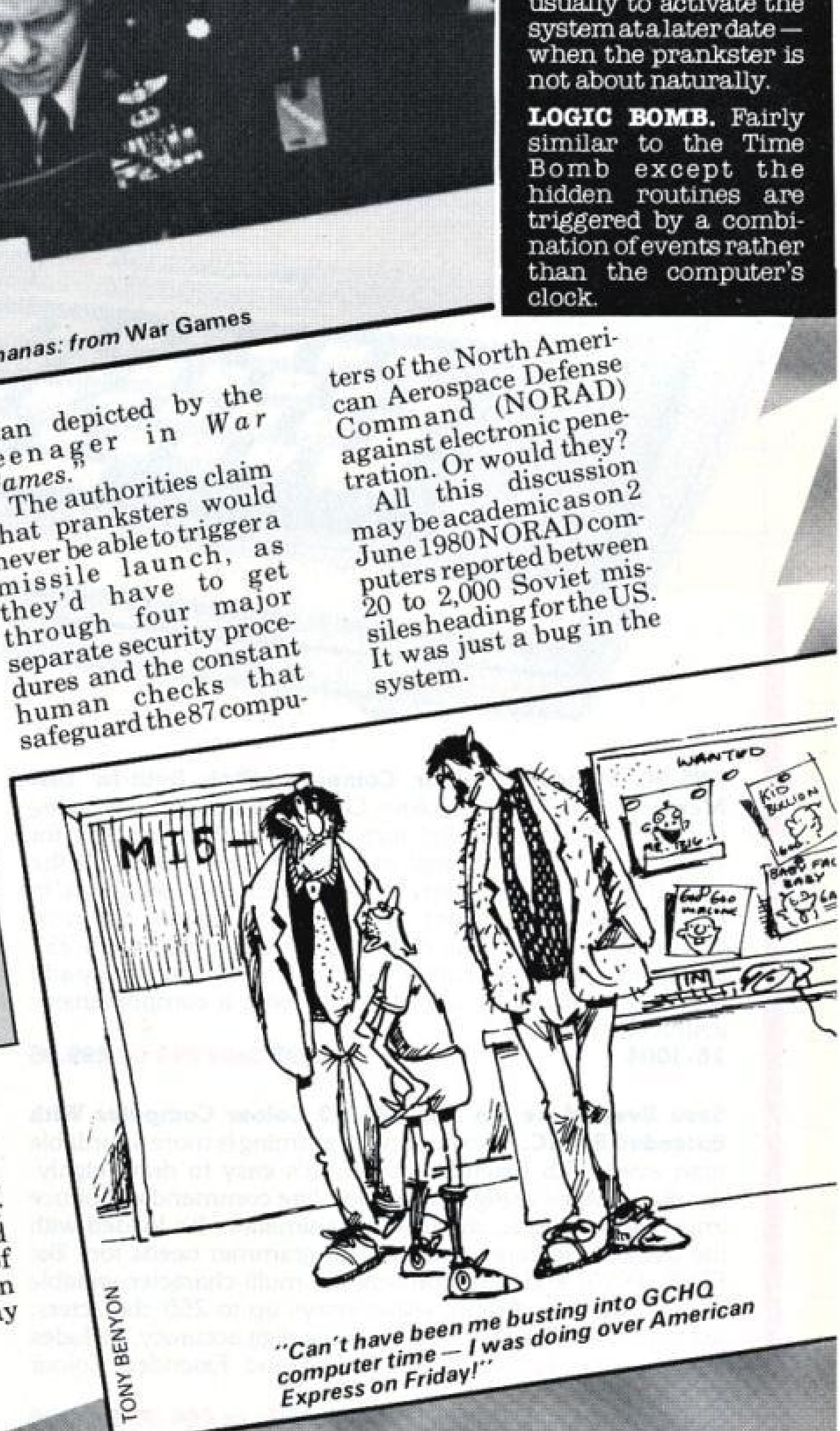
To be precise he broke into 200 computer files at 14 military, university and private research groups, from California to Norway. There is no record on our files as to what happened to him.

Ironically, former Secretary of Defense Alexander Haig now sits on the board of directors of MGM/United Artists — the makers of *War Games*. He says: "I'm confident that saboteurs or other enemy agents could penetrate segments of the system in an even more competent way than depicted by the teenager in *War Games*."

> **"It was a basic curiosity. We wanted to know what was going on in the world of computers. We were interested in seeing what a certain computer could actually do. It was the challenge of getting in and finding out what's there, like getting into a cave or climbing a mountain."**
> ***Neal Patrick*, computer freaker**

The authorities claim that pranksters would never be able to trigger a missile launch, as they'd have to get through four major separate security procedures and the constant human checks that safeguard the 87 computers of the North American Aerospace Defense Command (NORAD) against electronic penetration. Or would they?

All this discussion may be academic as on 2 June 1980 NORAD computers reported between 20 to 2,000 Soviet missiles heading for the US. It was just a bug in the system.



"Can't have been me busting into GCHQ computer time — I was doing over American Express on Friday!"

TONY BENYON

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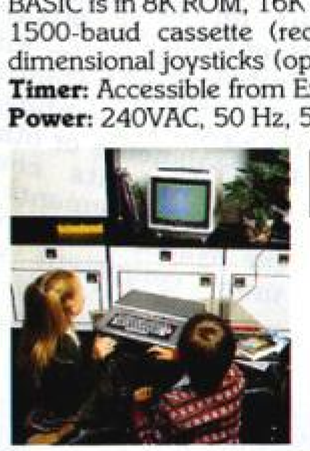
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26-3018* **£59.95**

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Specifications:

Microprocessor: 6809E 8-bit processor. **Clock Speed:** 0.894 MHz. **Keyboard:** 53 keys, including up, down, right and left arrows, BREAK and CLEAR. **Video Display:** 16 lines of 32 upper case characters. Colour graphics capabilities range from 32 x 64 (8 colours) to 192 x 256 (1 colour and background colour) with 3 intermediate formats. Higher resolutions in the same range are available through machine language, Extended BASIC or Program Paks. Output connects to any standard UHF TV set and includes video and sound. **Memory:** 16K internal dynamic RAM. Expandable to 32K. Colour BASIC is in 8K ROM, 16K ROM with Extended BASIC. **Input/Output:** 1500-baud cassette (recorder optional). Connectors for two 2-dimensional joysticks (optional). RS-232C serial I/O port. **Interrupt Timer:** Accessible from Extended BASIC or machine language only. **Power:** 240VAC, 50 Hz, 50W. *Installation required, Not Included.



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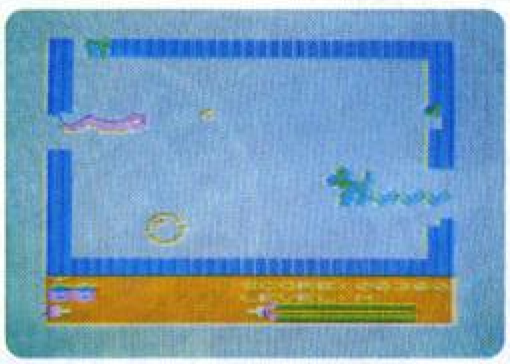
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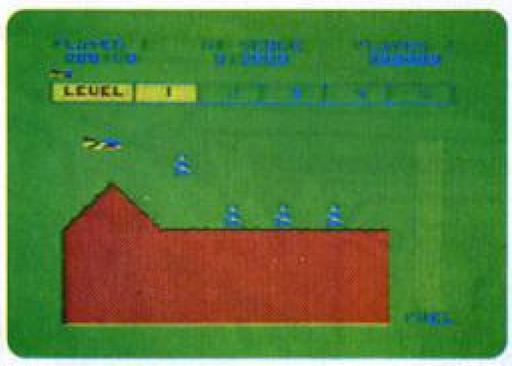
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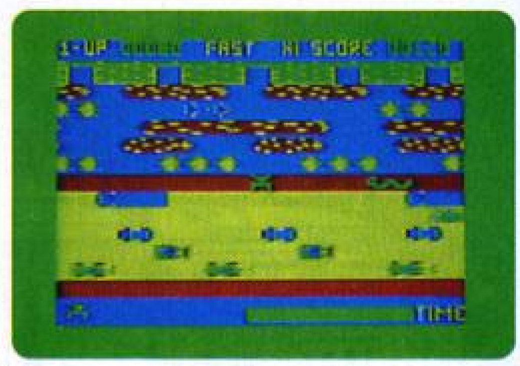




[A]



[B]

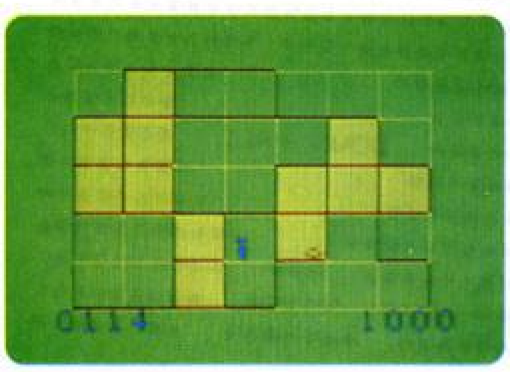


[C]

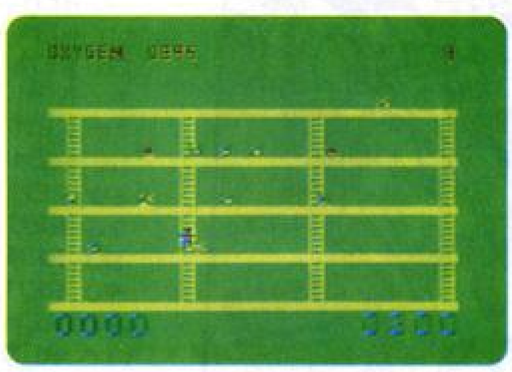
[A] **CRAZY PAINTER.** A high-speed arcade action game! Try your hand at painting the floor! Sounds easy? Yes, if the dogs, moths, caterpillars, boys, balloons etc. don't keep walking over the paint! Eight levels of difficulty. The catchy tunes played while you paint will have you "singing while you work". Keyboard or joystick controls. **26-7305**

[B] **SKRAMBLE.** Your mission is to penetrate the enemy's system and destroy their H.Q.. You will start with three spacefighters equipped with repeating cannon and twin bomb launcher. If you succeed in evading the elaborate defences, you will arrive at the core where flying becomes more difficult. Keyboard or joystick control. **26-7306**

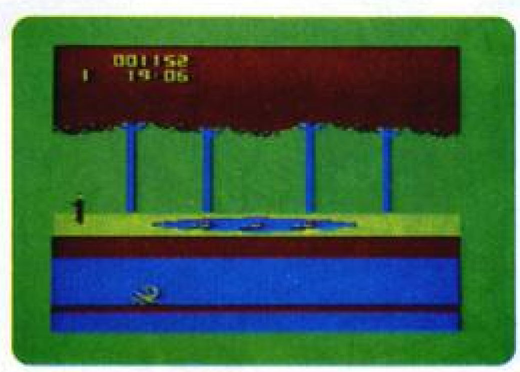
[C] **FROGGER.** The popular arcade game for the Tandy Colour Computer. Safely manoeuvre the frog to its home within the time allocated. Cross the highway without getting run over and cross the river without falling in. Avoid the traffic, snakes, crocodiles and diving turtles. For one or two players. Joysticks optional. **26-7304**



[D]



[E]



[F]

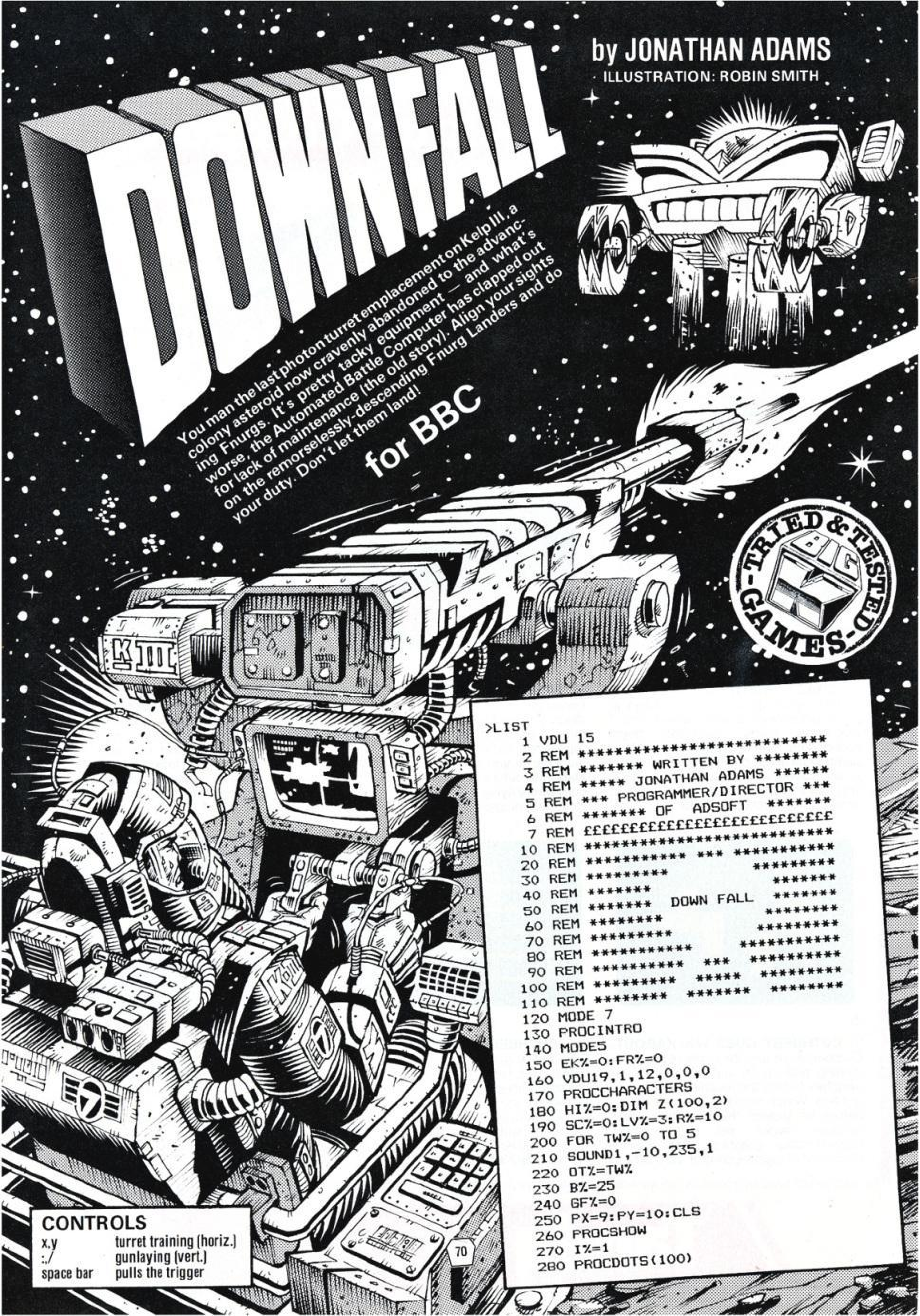
[D] **CUTHBERT GOES WALKABOUT.** Cuthbert must turn the lights of the lunar landing pad on by walking across the switches before the invading Moronians get him. Watch him do his victory dance before he tackles the next "pad" and another, larger, set of invaders. Superb colour graphics with music. Keyboard or joystick control. **26-7302**

[E] **CUTHBERT GOES DIGGING.** Cuthbert is guarding the site for a new launch pad. However the Moronians are still determined to get him! One touch and Cuthbert is electrocuted. The only way he can kill them is to trap them in a hole and hit them with his insulated hammer before they escape. Keyboard or joystick control. **26-7303**

[F] **CUTHBERT IN THE JUNGLE.** A high speed arcade action game with full colour graphics! Cuthbert failed to overcome the Moronians so he has been sent to the jungle! He must fight his way out collecting treasures, jumping pits and swinging over alligators whilst being aware of the killer scorpion. One joystick required. **26-7301**

Tandy®

Tandy Corporation (Branch UK),
Tameway Tower, Bridge Street,
Walsall, West Midlands, WS1 1LA.



DOWNFALL

by JONATHAN ADAMS

ILLUSTRATION: ROBIN SMITH

You man the last photon turret emplacement on Kelp III, a colony asteroid now cravenly abandoned to the advancing Fnurgs. It's pretty tacky equipment — and what's worse, the Automated Battle Computer has clapped out for lack of maintenance (the old story). Align your sights on the remorselessly-descending Fnurg Landers and do your duty. Don't let them land!

for BBC

TRIED & TESTED BIG K GAMES

```
>LIST
    1 VDU 15 *****************************
    2 REM ******************************
    3 REM ******* WRITTEN BY ********
    4 REM ***** JONATHAN ADAMS ******
    5 REM *** PROGRAMMER/DIRECTOR ***
    6 REM ******* OF  ADSOFT  *******
    7 REM £££££££££££££££££££££££££££
          ****************************
   10 REM ***************************
   20 REM *********** *** ***********
   30 REM *********           *******
   40 REM *******             *******
   50 REM *******  DOWN FALL  *******
   60 REM ********           ********
   70 REM *********        **********
   80 REM ***********     ***********
   90 REM **********  ***  **********
  100 REM *********  *****  *********
  110 REM ********  *******  ********
  120 MODE 7
  130 PROCINTRO
  140 MODE5
  150 EK%=0:FR%=0
  160 VDU19,1,12,0,0,0
  170 PROCCHARACTERS
  180 HI%=0:DIM Z(100,2)
  190 SC%=0:LV%=3:R%=10
  200 FOR TW%=0 TO 5
  210 SOUND1,-10,235,1
  220 OT%=TW%
  230 B%=25
  240 GF%=0
  250 PX=9:PY=10:CLS
  260 PROCSHOW
  270 I%=1
  280 PROCDOTS(100)
```

CONTROLS

x,y	turret training (horiz.)
:,/	gunlaying (vert.)
space bar	pulls the trigger



```
   290 PROCPAY
   300 IFI%=1 THEN I%=2 ELSE I%=1
   310 PROCMOVE
   320 SOUNDO,-(RND(5)+10),7,1
   330 IFLV%<1 PROCSPLAT:GOTO 190
   340 FORLP%=1TOR%+(R%ANDFR%=0)
   350 PROCmove
   360 COLOUR 2
   370 PRINTTAB(2,31);SC%;"0";TAB(17,31);
LV%;
   380 COLOUR 3
   390 PROCZAP
   400 NEXTLP%
   410 IFEK%=TW%+1 EK%=0:NEXT TW%
   420 IF TW%=6 R%=R%-1:GOTO200 ELSE300
   430 REM DATA
   440 DATA 24,24,36,231,231,36,24,24,102
,153,60,90,126,60,66,129,129,90,60,90,12
6,60,66,36,255,255,255,255,255,255,255,2
55
   450 END
   460 REM PROCEDURES
   470 REM
   480 DEFPROCCHARACTERS
   490 FOR Q=224 TO 226
   500 READ AA%,AB%,AC%,AD%,AE%,AF%,AG%,A
H%
   510 VDU23,Q,AA%,AB%,AC%,AD%,AE%,AF%,AG
%,AH%
   520 NEXT
   530 READ AA%,AB%,AC%,AD%,AE%,AF%,AG%,A
H%
   540 VDU23,255,AA%,AB%,AC%,AD%,AE%,AF%,
AG%,AH%
   550 ENDPROC
   560 DEFPROCDOTS(P%)
   570 FOR A1%=1TOP%:GCOLO,RND(3)
   580 PLOT 69,RND(1280)-1,RND(900)+123
   590 NEXT
```

```
   600ENDPROC
   610 DEFPROCINTRO
   620 CLS
   630 PRINT
   640 PRINTTAB(12)CHR$(130)CHR$(141)"DOW
N FALL"
   650 PRINTTAB(12)CHR$(132)CHR$(141)"DOW
N FALL"
   660 PRINT:PRINT:PRINT
   670 PRINTTAB(5)"WARNING! ALIENS ADVANC
ING"
   680 PRINT:PRINTTAB(2)"MOVE YOUR SIGHTS
 EXACTLY OVER THE"
   690 PRINT:PRINTTAB(2)"ALIEN AND FIRE B
EFORE IT SLIPS OUT OF"
   700 PRINT:PRINTTAB(2)"YOUR SIGHTS. FOR
 EACH ONE THAT LANDS"
   710 PRINT:PRINTTAB(2)"THE DAMAGE IS EN
OUGH THAT IT DESTROYS"
   720 PRINT:PRINTTAB(2)"ONE OF YOUR SHIP
S"
   730 PRINT:PRINT"                Z - LEFT      X
 - RIGHT"
   740 PRINT:PRINT"                : - UP        /
 - DOWN"
   750 PRINT:PRINT"
 - FIRE"                          SPACE BAR
   760 PRINT:PRINT"
R"                                SPACE BA
   770 REPEAT UNTILGET=32
   780 ENDPROC
   790 DEFPROCMOVE
   800 FOR A%=0TOTW%
   810 IFZ(A%,2)=0 GOTO900
   820 PRINTTAB(Z(A%,0),Z(A%,1));SPC1
   830Z(A%,1)=Z(A%,1)+1:Z(A%,0)=Z(A%,0)+(
RND(3)-2)
   840 G%=Z(A%,0)
   850 IFG%<1Z(A%,0)=1
   860 IFG%>18Z(A%,0)=18
   870 IFZ(A%,1)=29 AND G%=3ORG%=16 Z(A%,
0)=Z(A%,0)+1
   880 COLOUR1:PRINTTAB(Z(A%,0),Z(A%,1))C
HR$(224+I%)
   890IFZ(A%,1)=29Z(A%,2)=0:LV%=LV%-1:EK%
=EK%+1:FORSD%=1 TO2:SOUND1,15,5,4:SOUND1
,-15,1,4:NEXT
   900 NEXT
   910 ENDPROC
   920DEFPROCmove
   930 OX=PX:OY=PY
   940 IF INKEY-98ANDPX>1GF%=GF%-1
   950IFINKEY-67ANDPX<18GF%=GF%+1
   960 IFABS(GF%)=2PX=PX+SGN(GF%):GF%=0
```

Continued on page 78

BIG K ARCADE ALLEY

'GOD IS ALIVE AND WELL AND WORTH 10,000 POINTS'



Checking out a "Wimpy Bar in Hell", BIG K Arcades Editor PAUL RAMBALI encounters Manic Waterskiers, Dragonslayers (would-be) and a new species of dangerous alien — the Committed Disapprover (female). His solution? Zap first and answer questions afterwards...



THERE I was, pausing a moment to review tactics, mentally replaying my last fatal encounter with the alien Pod and its cargo of malevolent Swarmers. There I was, fingering the coins in my pocket, when this girl asked me: "Why is it you never see girls playing video games?"

Normally, I do not care to talk to girls while I am busy defending earth. I could have simply fled to another arcade. I could have wiped her from my screen with a Smart Bomb. I could have cited the wellknown fact that girls are boring.

"Dunno," I muttered. I was going to say Pac Man but thought better of that too.

The girl was a parole counsellor, working with minor offenders aged between 17 and 26. This, however, did not grant her any new insights. She didn't know why girls don't play video games. Dragged into the arcades by their boyfriends — as sometime happens — they loll impatiently by the machines, frustrated by the competition from these gurgling, twinkling contraptions.

She nonetheless suspected that there is a *good reason* why girls don't play them, that they somehow *know better*. They aren't hoodwinked by the dubious pleasures of lights, noise and high-speed rocket fire. They can intuitively sense the dangers of a build-up of gamma wave radiation from long hours at the screens. They are unmoved by the natural masculine propensity for war and destruction that many games thrive on.

This is the sort of condescension that the mature video gamer must endure as he guiltily feeds another few coins to the hungry **Gorf**, envying the gleeful, guitless abandon — not to

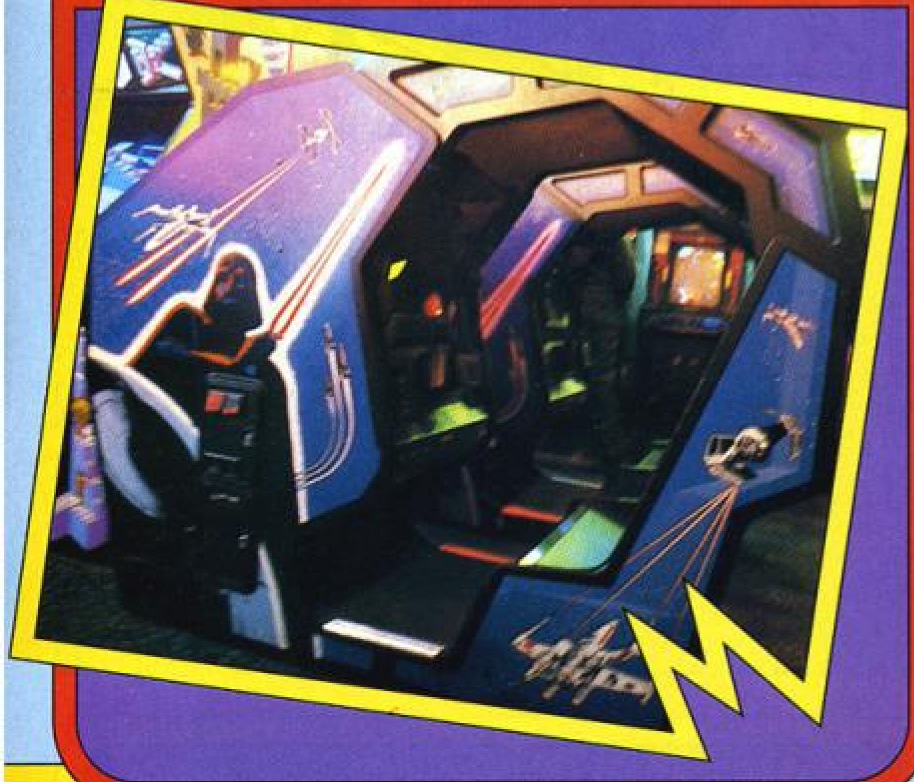
BE AN IN-AT-THE-DEATH STAR

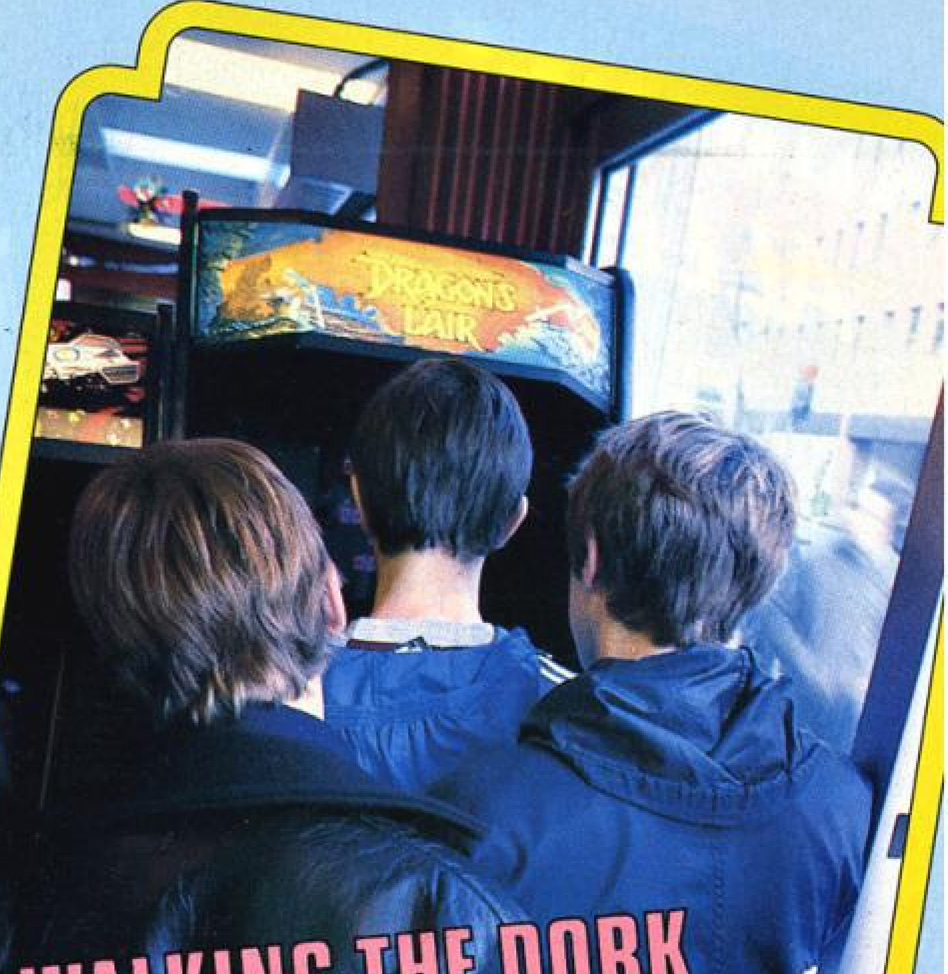
IGNORE THE wall-standing version and get straight into the cockpit of Luke Skywalker's long fighter, where you will be greeted by the theme from **Star Wars**. *With R2D2 bleeping in your ear, you'll soon be plunging through space towards a Death Star guarded by relatively few enemy ships. These are dealt with quickly enough. Use of the force that Sir Alec Guinness extols over you shoulder is not recommended. Concentrated laser fire is best. With Sir Alec's help, you'll then find youself steering down a channel on the Death Star's surface, parrying the odd Empire salvo or two. So far, so easy. Next, you have to get out of the channel via an exhaust port, which Luke himself tells you with a satisfied yelp is "dead ahead!"*

This is not so easy. In fact, it's a bitch.

It cost me dearly to learn that you actually have to blast your way through it, and not rely on the Force that seems to grip your controls at this point.

Thereafter, things get more complicated, enemy fire multiplies, but no other feats of lateral thinking are required. Your second pass takes you down to the surface of the Death Star where you can blast away at enemy towers until your shields are gone, or your money, or your taste for space games. With its three-colour 3D vector graphics, **Star Wars** *is the best space-flight simulator yet. It doesn't offer any great complexity, but it's great while it lasts.*





WALKING THE DORK (NUDGE, NUDGE)

PRESENTLY languishing in prime sites, its movie-thriller type come-on and full animation screen (not to mention its appetite for 40p upwards a game) is somehow failing to attract droves of players. Using a videodisc to generate **Dragon's Lair** should have been impossible fast-moving and fully-detailed cartoon action on the screen, **Dragon's Lair** should have been impossible to get a game on by now. Trouble is, it's impossible to play to begin with. Yanking the joystick and pumping the sword button have no apparent effect on the good knight Dirk as he stumbles from ordeal to cliffhanger. Or perhaps Dirk himself is the problem. An amiable, gangly buffoon whose expressions range from wary indecision to grim effort to startled panic is hardly the stuff of gallant fantasy. Who could want to identify with this twerp? Adding insult to injury, the novice finds Dirk's five lines and his 40p indecently quickly spent. The trick, it turns out, is to **nudge** the controls at precise moments to steer Dirk through the gauntlet of medieval and supernatural nemeses. Skulls, ghouls, ectoplasm and living slime etc. can sometimes be put to the sword and sometimes not, in which case it's better to run — through crumbling passages, over chasms, down rapids — taking care not to make a wrong turn. Figure out your own way through the labyrinth of perils that leads to the Dragon's Lair. Once there, you'll see a shadowy hooded figure (slice him like salami) and ambling blobs of brown goo (dodge these). The girl in the fishbowl that you have come to rescue is getting excited by now, and a pile of treasure threatens to topple, alerting the sleeping dragon nearby. I've yet to witness what happens after Dork, sorry, Dirk, despatches the dragon and gets the girl, but I hope it was worth it.

mention the effortlessly superior scores — of the 10-year-old Vid-Kid at the next machine.

But this girl had another complaint. One of her charges — a 7-year-old — had been arrested for shoplifting goods worth just a few pounds. He told her of a formidable career in the field, the fruits of which — over £100 a week — paid for an ever more urgent fix of the arcade drug.

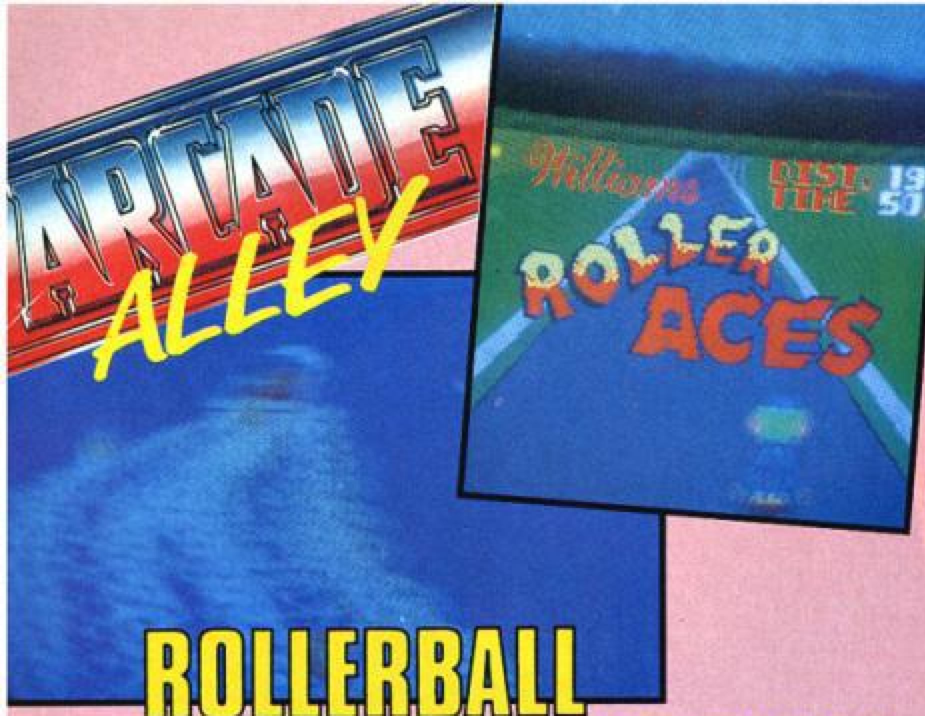
It's not an unusual story. In 1980, a 12-year-old in Japan walked into a bank armed with a shotgun and demanded not bills but *coins* — you can guess what for. Rattled by such tales, Labour MP George Foulkes warned the House of Commons in 1981 of a nation (ours) over-run by "youngsters with glazed eyes!" His Tory opponent Michael Brown — who later confessed to having had a few games himself on the way to the House — denounced this intrusion of the welfare-state mentality into the genial gonzo pleasures of the populace and carried the day.

Foulkes was left mumbling that video games are a kind of *glue*, equally toxic and mind-sucking, the potential cause of a wave of petty crime. The parole counsellor agreed. She sent her 17-year-old to Gamblers Anonymous to try to cure his coin-slot fever. Instead of sharing his woes with executives broken on the roulette wheel and bingo-playing housewives with glazed eyes, the 17-year-old found himself surrounded by fellow Humanoids, their lives wrecked by the untiring vigil they had selflessly maintained against the encroaching alien hordes.

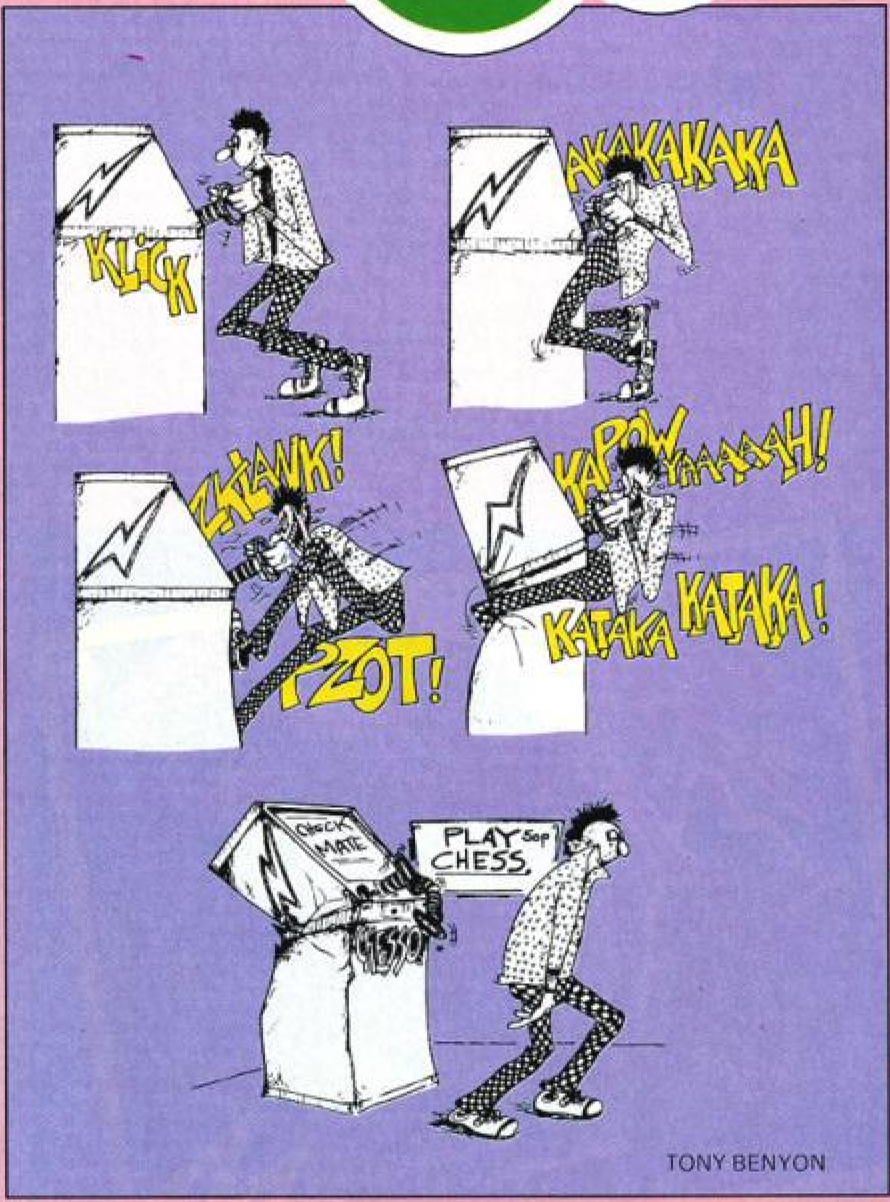
It struck me that there is one last hope for them. We'll call it Shoplifter or maybe Arcade Craze. You are a Vid-Kid being hounded through the local shopping precinct by teachers and parents who bomb you with homework or visits to relatives.

Your aim is to play all the different games in your district and to do this you have to augment the money you have at the start by various small larcenies.

Each new level adds greater perils — truant officers, police, etc. — and takes you closer to the West End, where you must negotiate winos, hustlers and other vermin to reach the Ultimate Game. But Arcade Craze has a nasty twist: an electrified joy-stick! A few prolonged bouts of this aversion therapy should be enough. The words



> *'With one knee against the machine and the other leg stretched back, with spine upright and arms straight, the Defenders sway back and forth to the digital rhythm of play, forefinger near permanently on Thrust, middle finger agitating the Fire button, thumb poised over the Smart Bomb. This is the stance of the True Defender, his uniform a Tacchini track suit zipped up to the chin.'*



ROLLERBALL WAS NEVER LIKE THIS

*THESE TWO cute variants of the **Pole Position** scenario have been turning up at a few soak sites lately. Using the same sort of display — a track receding to a vanishing point at the top of the screen — they promise spills other than the oily sort.*

*In **Roller Aces** you are a street-skater whizzing down a track littered with rocks and pitted with holes. You can move left and right and — with enough speed — jump over obstacles. Naturally, these tend to increase, and the game hots up when two other skaters start chasing you and have to be elbowed out of the way before they can elbow you.*

All of which is pretty good arcade action. But — considering the graphic verisimilitude of the skater — more thought might have been given to the details. A street scene would have been better than a track, and the sack of money you must pick up for extra points should obviously have been a ghetto-blaster.

*More fun, but harder to master, is **Tropical Angels**, in which the track is a stretch of water. You steer a speed-boat pulling a water-skier through a far more realistic course. She — for it is a she — has to jump over rocks and off ramps to score points. A neat, refreshing game with excellent visuals, **Tropical Angels** may still face unwarranted arcade death due to its lack of the familiar aggressive elements.*

'Ready Player One', rather than quickening the pulse, would fill them with horror.

The girl thought she could see a flaw in this. What would drive an arcadophile to stay on the console? Simple. The lure of the Ultimate Game. The final level would be the game itself; with super-fast 3D vector graphics and the noise levels of the Heathrow flightpath. What sort of game would it be? Who knows. Ever since this thing started in Nolan Bushnell's bike-shed, the debate has raged. The finest minds of our generation, while not busy improving their hand-eye co-ordination, have wrestled with this philosophical abstraction. Does God exist? Who cares? The real question is: how many points is he worth?

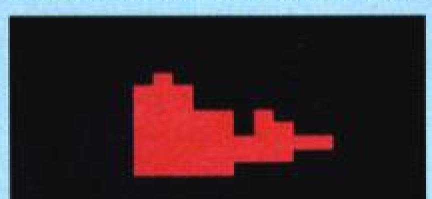
Defender has become a kind of relaxation in the arcades these days. Its customers are either veteran **Defenders** taking a breather from some new challenge ... or social scientists. You can always spot a social scientist doing field work in the arcades by their embarrassed grimaces as they play — unprepared for the simple excitement and humiliated by a quick defeat. Also, they are liable to ask you about video games; the last thing you want while you're playing one. Arcades are places of intense human science, which is as it should be. Even the goon at the change desk knows this. He doesn't even look up, let alone open his mouth.

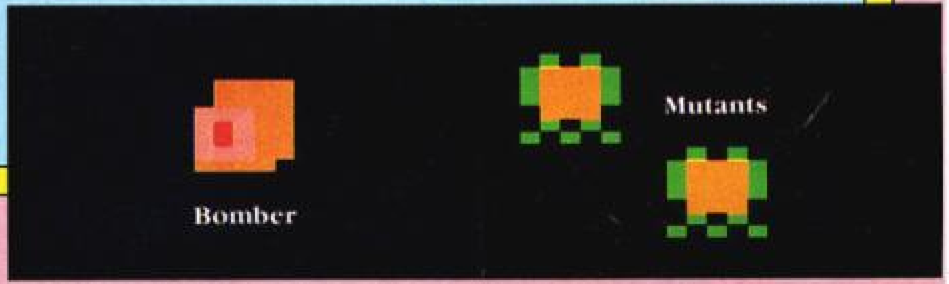
But if they knew where to look, the social scientists could still see a True Defender in action. In the Electric Ballroom on Friday nights, I've seen **Defender** clocked at around wave 56 and with a score of a million, not 100,000 as on some machines. Here, above the noise of the latest electrobeat import from New York — the perfect microprocessed soundtrack — the True Defenders make their stand, the really *wicked* games are fought.

With one knee against the machine and the other leg stretched back, with spine upright and arms straight, they sway back and forth to the digital rhythm of play, forefinger near permanently on Thrust, middle finger agitating the Fire button, thumb poised over the Smart Bomb. This is the stance of the True Defender, his uniform a Tacchini track suit zipped up to the chin.

And I salute him. Someone has to test the fearful mathematics of the games, exhaust their novelties, ascertain their nuances. Someone has to go armed with only their wits and reflexes into the video arena, the arcades that somebody or other called Wimpy Bars in Hell. And what better setting for this fast food of the vacationing intellect?

"But what is it about arcade games?" Pressed the girl finally. I told her they were the modern-day fairground rides. I told her to try one. There wasn't time to say more. The Landers were already drifting earthwards . . .

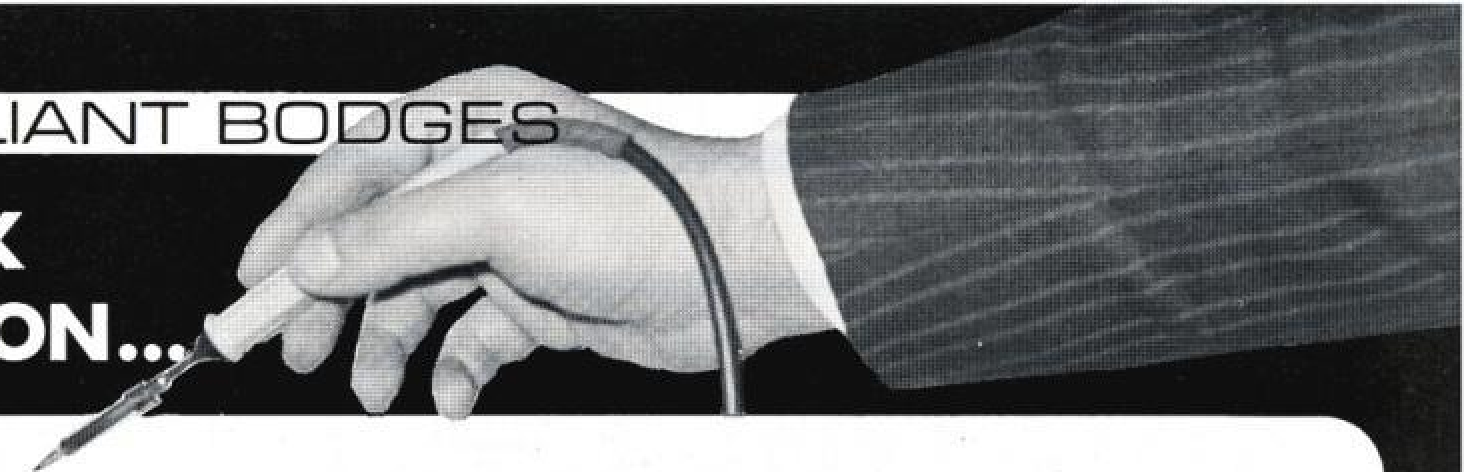

Defender


Bomber

Mutants

BRILLIANT BODGES

BIG K SOLDERS ON...



BUILD YOUR OWN CHEAPO EPRO!

Erasable, programmable ROM chips or carts are an uncharted sea for even the most dedicated hackers. ANDY GREEN tells you how to build your own for the BBC Model B. Irons at the ready? Then plug 'em in and get wiring . . .

EPROMS COME in all shapes, sizes and capacities. The programmer will be able to read and program the two types that can be used in the BBC computer — the 2764 and the 2712S. The 27 is a 'family number' for EPROMs, and the 64 and 128 refer to the capacity of the chip in K bits. Since the BBC uses an 8-bit processor — meaning it talks in terms of 8 bits (one byte) at a time, dividing the 64 or 128 by 8 gives the number of bytes in each chip . . . . 8K or 16K. The 8K 2764 chips are — surprise, surprise — cheaper than the newer 27128s, but neither are exactly penny chews . . . you can pick up a 2764 for less than a fiver, but the 27128s are prohibitively expensive at £18 a time. However, this is mainly because the 27128s are only recent developments, and the manufacturers are frantically trying to recoup all their R&D money, so expect to see the price plummet over the next six months.

Similar Chips

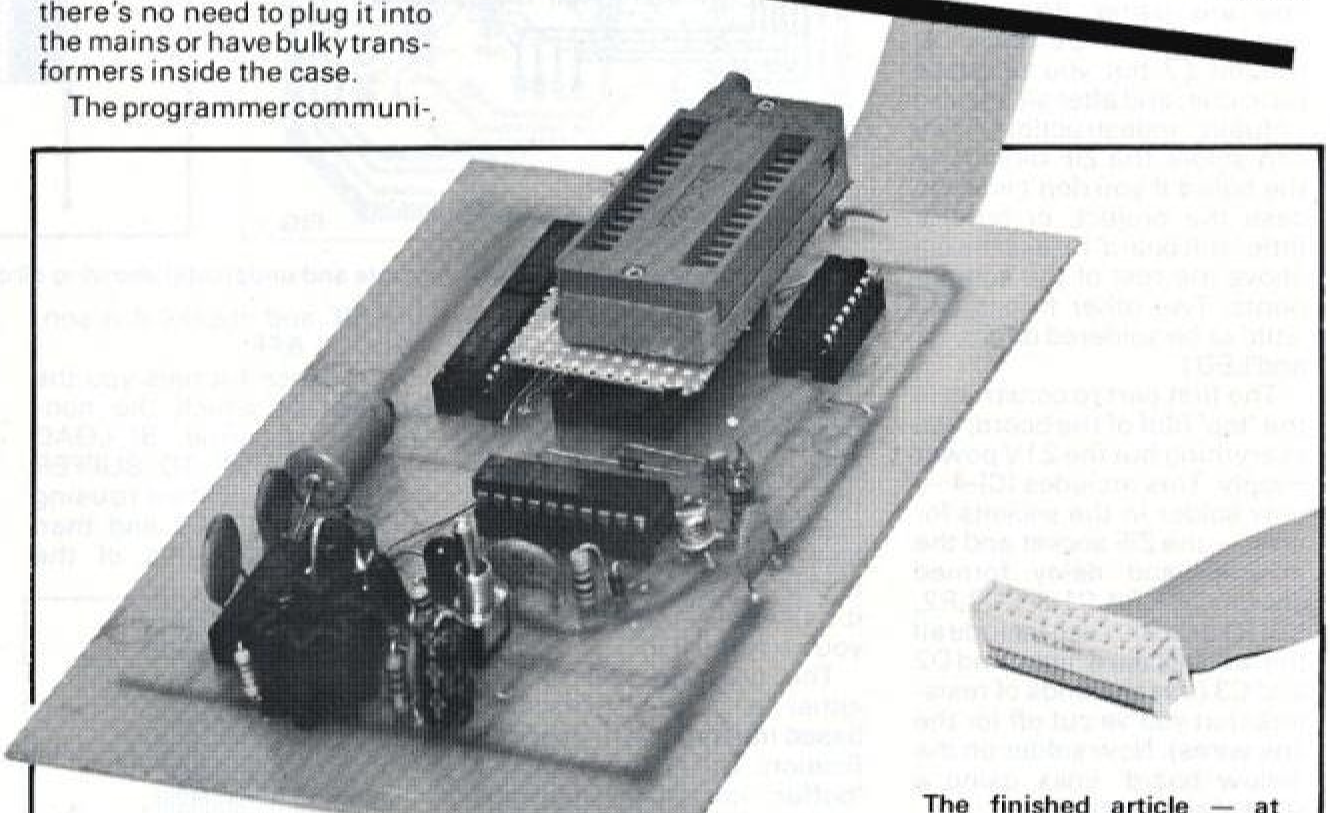
The BBC also uses ROM chips which are very similar, but for one big difference: you can't re-program them as you can an EPROM. They also use the 64/128 system of identifying the capacity of the chip, but with a prefix different to 27, to show they're ROM and not EPROM.

The Programmer described in this article was designed to be easy to use, elegant and self contained . . . and also inexpensive. Malison Electronics are currently marketing a (admittedly slightly more complex) programmer for £185. The BIG K programmer will cost less than £30 to build, including the case and leads and all that stuff. More importantly, as this programmer was being designed, in early January, nobody had any programmers available off the shelf except — predictably — the £185 models. Both Technomatic and Watford Electronics do cheaper versions at about £100 after VAT, but the only sign of either so far are promo photographs.

Neat Switch

The BIG K EPROM Programmer also contains its own on-board 21V power supply, derived from the computer's 5V supply using a neat Texas Instruments switching regulator, the TL497, so there's no need to plug it into the mains or have bulky transformers inside the case.

The programmer communicates with the computer by a ribbon cable leading to the User Port on the underside of the BBC. A short Machine Code/BASIC program is also included to run the programmer through a series of easy-to-use menus.



The finished article — at about £90 less than the shop price.

You may be wondering what such a device would need with 21V, since the BBC hasn't got any supply lines of anything near that voltage. Well, the EPROM only needs your average everyday computer 5V when you're trying to read from it, but when you are writing to it, i.e. programming it, it needs 21V to 'burn in' the data. Once it's in, the chip 'remembers' the data until you go through the erasure process to prevent this.

Erasing an EPROM consists of exposing the device to ultraviolet light for a few minutes (you wondered what the little window on the top of the chip was for, didn't you?).

Exposure

Simply, when the light hits a cell inside the chip, it boots out the electrons you so carefully put in with your 21V, leaving it empty. This empty state equates to a logic 1, so after erasure an EPROM is full of &FF bytes. The programming process fills some of the cells up with electrons, which is read as being a logic 0. Yes, you've guessed it, this is why they cover up the window with tape after the EPROM has been programmed. No, it wasn't to stop you peeping, but to keep out daylight and any spare UV light it might carry with it. Remember, after erasure, cover the window with coloured tape.

Figure 7 shows a block diagram of how the programmer works. Twelve of the 14 address lines the EPROM needs are got from a set of 3 four bit counters. The reasoning behind the choice of computers instead of just connecting discrete 10 lines is to minimise the number of connections that need to come from the computer, in this case only eight, from the

user port, plus one extra line CB2, also from the user port that decides whether the other eight are to be sent to the EPROM data lines or an 8 bit latch, 74LS374. The 21V power supply is connected to the EPROM with a switch, S1, so giving the user final control, for safety's sake.

NOTE: *Never* take out an EPROM while the 21V power is on, as the manufacturers say this will kill your EPROM. If you must abort a programming session, first switch off the 21V at S1 then pull out the chip.

To the construction of the project . . . it's mounted on single-sided PCB about 4" by 2" with a ZIF (Zero Insertion Force) Socket for the EPROM you are using. The ZIF is accursedly expensive at around £7 but you've got to have one, and after all, they're virtually indestructible. You can solder the ZIF directly to the board if you don't want to case the project, or build a little 'stilt board' to take the ZIF above the rest of the components. Two other things can 'stilt' or be soldered direct, S1 and LED1.

The first part to construct is the 'top' half of the board, i.e., everything but the 21V power supply. This includes ICI-4 — only solder in the sockets for now — the ZIF socket and the inverter and delay formed about TR1,R4,C1,D1,C7,R2, C6, R1 and R3. Also include all the 'above board' links and D2 and C3 (use the ends of resistors that you've cut off for the link wires). Now solder on the 'below board' links using a slice of ribbon cable.

Connect Ribbons

Next connect one end of the main piece of ribbon cable to the 20-way IDC connector for the user port, making sure that the wire with the red stripe goes to pin one on the connector. At the other end of the ribbon cable, peel off each wire to about an inch and cut off some of the wires as in Figure 3 — make sure the red

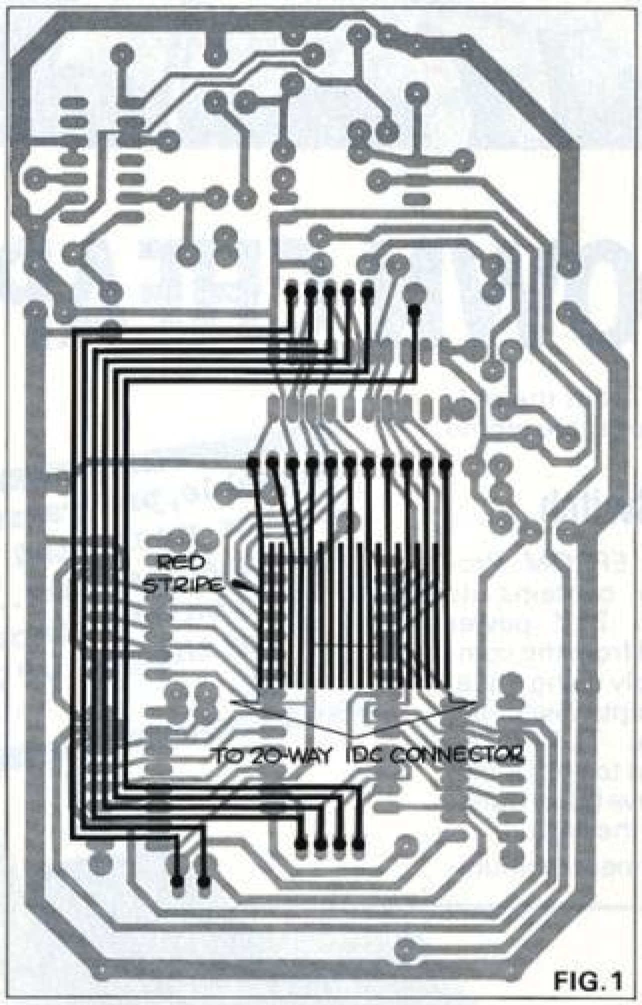


FIG.1

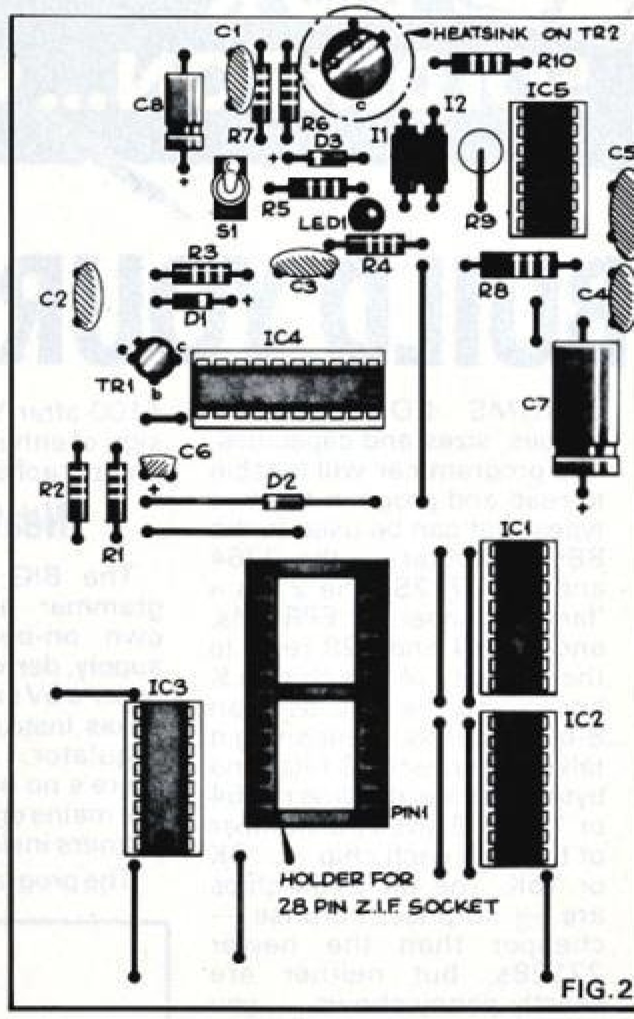


FIG.2

The completed circuit (topside and underside) showing all components in position.

stripe is in the same position as in the diagram! Now solder the remaining wires to the pads as in Figure 3.

Put the hardware to one side for a moment and now type in the software. Be especially careful with the Assembly code at the end, and save it to disc or tape before running it. Check it through after you've typed it in.

The program will run on either a disc- or cassette-based machine with no modification. The program uses a 'buffer' in main memory, starting from &3000 to contain the data you want to program into the EPROM or data you've read out of the EPROM.

Tells Address

The main menu will pop up after a short pause and ask which of four functions you want to use. The four are A) TEST FOR ERASURE — this goes through the EPROM in the ZIF and checks if it contains all &FF.

If it doesn't it tells you the address at which the non-erasure occurred. B) LOAD FROM EPROM TO BUFFER will first ask you if we're using a 2764 or 27128 and then dump the contents of the EPROM currently in the ZIF to a memory buffer starting from &3000. C) DUMP TO EPROM asks you if we're using a 2764 or 27128 and then dumps out the appropriate amount of memory from &3000 onwards to the EPROM, starting from the first byte in the

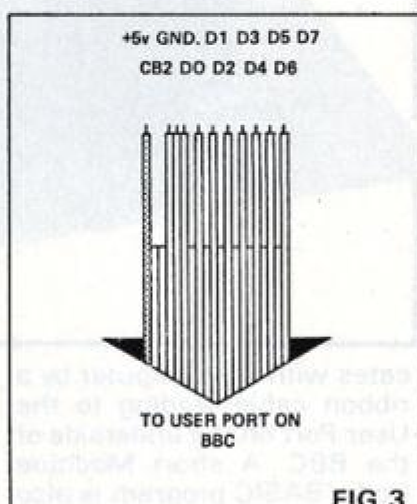


FIG.3

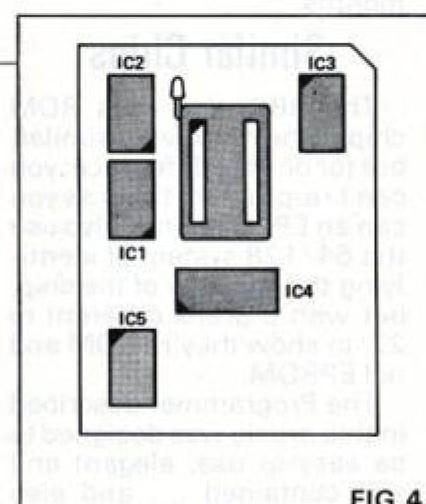


FIG.4

Ribbon cutting pattern (left) for the BBC User Port Cable (programmer end). Note position of index strand. Right: 0 Orientation of ICs and ZIF. View from above.

CAPACITORS	RESISTORS	SEMICONDUCTORS	THE REST
C1 = 0.05µF	R1 = 39KΩ	TR1 = BC1Ø8	I1 = 47µH I2 = 22µH
C2 = 0.05µF	R2 = 1KΩ	TR2 = 2N3553	LED1 = Red LED
C3 = 0.05µF	R3 = 10Ω	IC1 = 74LS161	S1 = SPST miniature switch
C4 = 0.05µF	R4 = 10KΩ	IC2 = 74LS161	TØ5 heatsink for 2N3553
C5 = 150pF	R5 = 10KΩ	IC3 = 74LS161	28 pin ZIF socket
C6 = 10pF	R6 = 21KΩ	IC4 = 74LS374	3 off 16 pin DIL sockets
C7 = 220µF @ 10V	R7 = 1.2KΩ	IC5 = TL497	1 off 2Ø pin DIL socket
C8 = 22µF @ 25V	R8 = 0.5Ω 1W	D1 = IN914	1 off 14 pin DIL socket
	R9 = 33Ω 1W	D2 = IN914	Link 1— Link 12 = Use resistor 'cutoffs'
	R1Ø = 18KΩ	D3 = IN914	
			PL1 = 20 way IDC nn socket
			= 1m. of 20-way ribbon cable

EPROM. D) COMPARE BUFFER WITH EPROM offers an easy way of verifying a good programming session on an EPROM.

Right now we can only use options A, B and D, since we don't have the 21V power supply built yet. Plug in the board to the user port on the BBC and use a voltmeter to check for 0V at pin 8 on ICI-3, 0V at pin 14 on the ZIF and 0V at pin 10 on IC4. There should also be 5V at pin 16 on ICI-3, 5V at pin 28 on the ZIF and 5V at pin 20 on IC4. If all that's OK then unplug the user port connector and plug ICI-4 into their sockets (make sure they're the right way round) then plug the User Port connector back into the BBC.

&3F for a 27128. Then it will return you to the main menu. If this didn't happen, you've a bug in the program you typed in . . . get a friend to check it against the listing.

The number was the 'block' of 256 bytes the program was currently reading . . . 32*256=8192=8K capacity of a 2764. This appears whenever the program is accessing the EPROM and is designed to reassure the user that something is actually happening.

You should now have a copy of the contents of the EPROM in the ZIF in memory from &3000 to &4FFF (up to &6FFF if you're using a 27128). If you've got DISC DOCTOR then you can use the MZAP function to check it out. If you

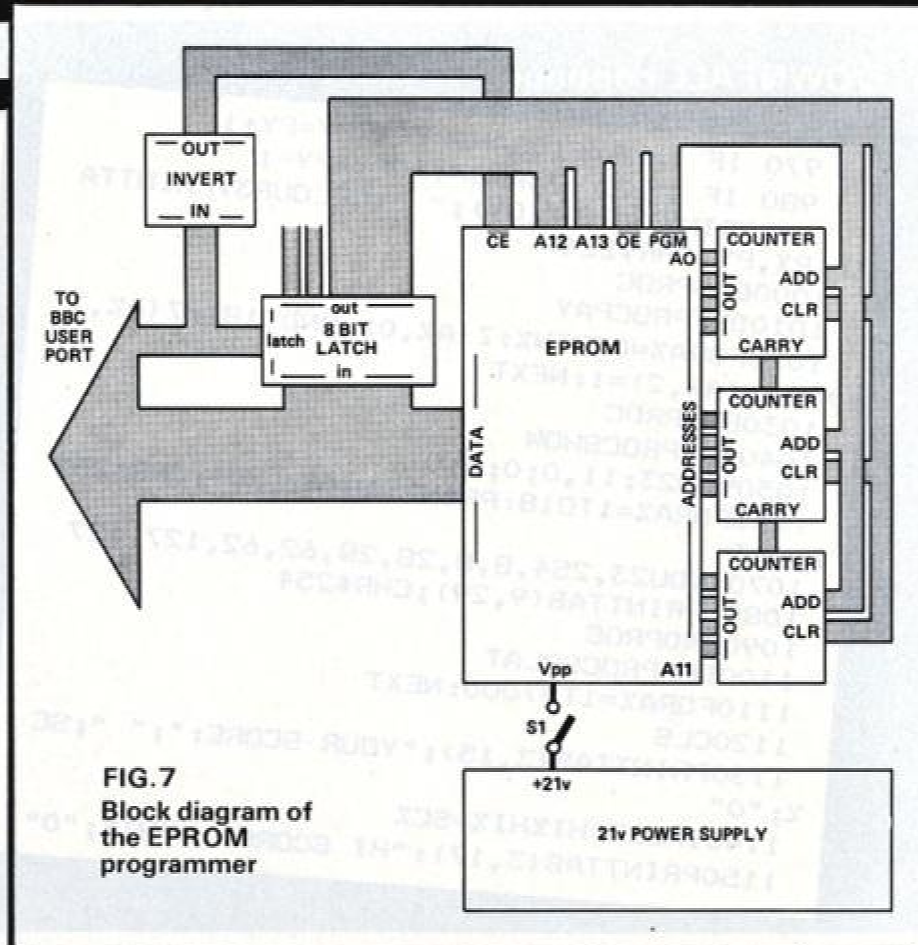
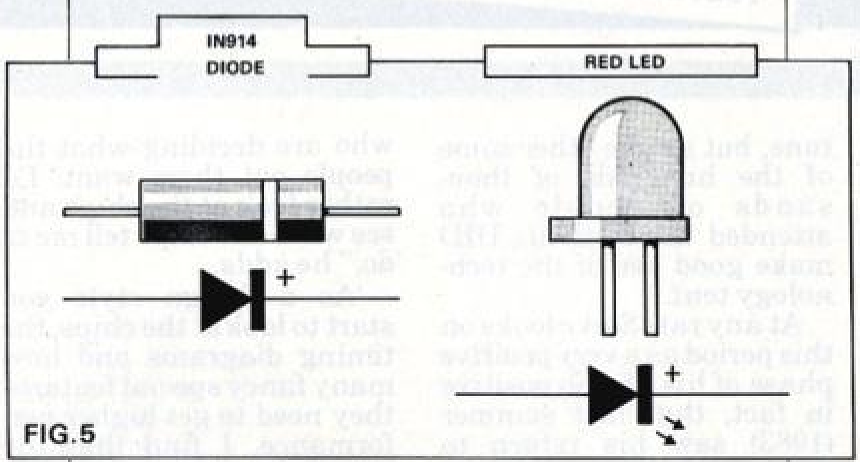
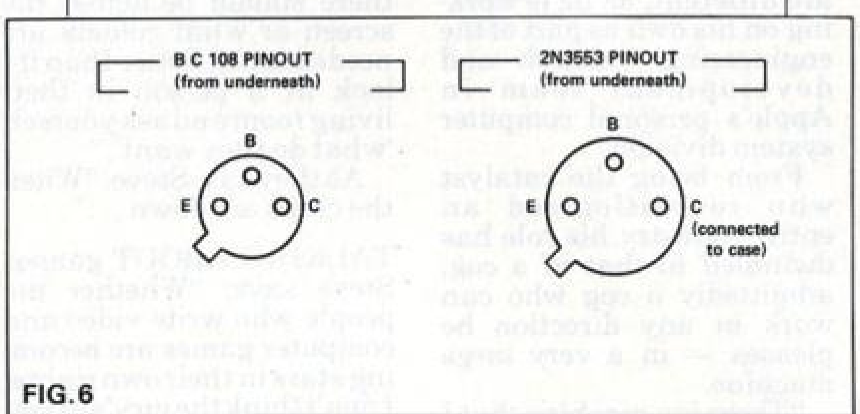


FIG.7
Block diagram of the EPROM programmer



Diode orientation.



Transistor orientation.

Old ROM

Now you're going to have to get your hands on a used EPROM, i.e., one full of data, or an old ROM that has been used in a BBC. Possible contenders are old OS ROMs, old BASIC 1 chips etc. We are going to need this to check that the programmer is reading from the ZIF socket correctly.

Plug the EPROM into the ZIF — make sure the notch is pointing in the right direction for pin one — and select option B on the menu. A two digit number should appear in the top centre of the screen and increment from &00 to &1F if you're using a 2764 or

haven't got DISC DOCTOR then either *SAVE &3000-&5000 if you've got a disc system and do a *DUMP, or — for you cassette people — use a FOR/NEXT loop to print out the contents of the buffer.

However you do it, the buffer should contain mostly unrecognizable garbage, but the ASCII of some areas should produce appropriate words — e.g. near the start of the BASIC ROM there's a list of commands that it supports in ASCII. If it's all come out as a load of &FFs then in addition to doing the checking below, examine the diodes . . . are they the right way round?

Check to see that 'zones' don't repeat themselves in sets of 256 bytes, and that the whole 8 or 16K is filled with the strange numbers. If any of the above errors are true, check the wiring of the address counters ICI-3 and make sure that all the legs of the ICs are inside their sockets and not bent under the chip body.

If everything seems OK so far then unplug the board — it's time for the 21V power supply. As I mentioned before, the 21V supply is based around the TL497 switching regulator. Unfortunately, it isn't beefy enough to handle the 60 odd milliamps we're going to be pulling through it, so it uses a 2N3553 transistor as well. Technomatic are the only people I know to stock the TL497, and Henrys are the only people in the Edgware Road to stock the 2N3553. The transistor will also need a TO5 heatsink "hat" because it gets quite hot.

Don't Worry

Two other weirdo components in the 21V design are the 47 and 22 microHenry (no relation) inductors, and I could only get these from Cricklewood Electronics. They don't care which way around they're mounted, so don't worry. Of course, you could take the easy way out on all this hunting down and order a complete kit (including PCB) from the address at the end of the article. After train and bus fares, it's a good deal.

Anyhow, back to the 21V construction. The two large power resistors 0.5 ohms and 33 ohms will get rather warm, so mount them away from other components.

For starters, only solder in the socket for IC5 and don't insert the chip yet. Make sure the ZIF is empty, and connect the board back up to the BBC. Check IC5 pin14 for 5V and pins 2,4 and 5 for 0V. If its OK then — make sure the ZIF is empty again — insert IC5 and, if it isn't lit already, flick S1 to make LED1 light up. Now test pin 1 on the ZIF with your voltmeter. It should be around 21V, perhaps a little more, but that will come down under loading.

If it ain't, then unplug the board from the BBC and check orientation of a) transistor 2N3553, b) IC5 TL497, c) Zener diode, d) the IN914 diode, e) the LED itself and f) C3, the negative side of which should be connected to the 0V rail.

Looking good

Assuming all's well, flick switch S1 to turn off the 21V at pin1 on the ZIF — measure it and see. The LED should now be off and pin1 on the ZIF at 0V. Okay, things are looking good.

Now might be a good time to mention that you can only program an EPROM once between erasures, and EPROMs are only rated good for about 30 erasure/programming cycles.

If you don't have access to a source of UV light — a sunray lamp or UV PCB making equipment — then take my advice and DON'T buy a ready-made one. One with a timer costs up to £60! All you need is an unfiltered UV bulb — Watford Electronics flog them for £8 a time — some three core wire, a plug, a case

Continued on page 94

DOWNFALL continued

```
970 IF INKEY-105ANDPY<27PY=PY+1
980 IF INKEY-73ANDPY>0PY=PY-1
990PRINTTAB(OX,OY);" ":COLOUR3:PRINTTA
B(PX,PY)CHR$224
1000ENDPROC
1010DEFPROCPAY
1020FORA%=0TOTW%:Z(A%,0)=RND(18):Z(A%,1
)=0:Z(A%,2)=1:NEXT
1030ENDPROC
1040DEFPROCSHOW
1050VDU23;11,0;0;0;0
1060FORA%=1TO18:PRINTTAB(A%,30);CHR$255
:NEXT
1070 VDU23,254,8,8,28,28,62,62,127,127
1080 PRINTTAB(9,29);CHR$254
1090ENDPROC
1100DEFPROCSPLAT
1110FORA%=1TO7000:NEXT
1120CLS
1130PRINTTAB(3,15);"YOUR SCORE:";" ";SC
%;"0"
1140IFSC%>HI%HI%=SC%
1150PRINTTAB(3,17):"HI SCORE  :"HI%;"0"
1160*FX,15,0
1170COLOUR3:EK%=0
1180S=GET
1190ENDPROC
1200DEFPROCDOTS(A%+RND(10))
1210FORA1%=1TOA%:GCOL0,RND(3)
1220PLOT69,RND(1280)-1,RND(900)+123
1230 NEXT
1240ENDPROC
1250DEFPROCZAP
1260FR%=0
1270IFINKEY-99ANDB%>0FR%=608
1280IFFR%=0 ENDPROC
1290FX=64*PX+32:FY=1024-(32*PY)-16
1300FR1%=96
1310MOVEFR%,FR1%:DRAWFX,FY:GCOL0,0
1320FORY%=0TOTW%:IFPX=Z(Y%,0)ANDPY=Z(Y%
,1)ANDZ(Y%,2)<>0Z(Y%,2)=0:SC%=SC%+11-R%:
EK%=EK%+1:SOUND1,-15,100,1:SOUND1,-14,2,
1:SOUND1,-15,200,1ELSESOUND1,-10,235,1
1330NEXT
1340MOVEFR%,FR1%:DRAWFX,FY:GCOL0,3
1350B%=B%-1:PRINTTAB(6,31);B%;CHR$32;
1360ENDPROC
```

WOZNIAK Continued from page 36

look at artificial intelligence but not from the point of view of studying how it is done or by spending hundreds of man hours writing some software. I want to find some clever trip. I think there has got to be some simple way by which you will write one little five-page program and that will allow the computer, based on all of its sensory inputs and all of its motor outputs, to learn."

He disputes the theory (rife in some quarters) that if the software could only be good enough a computer would immediately be able to compete with humans in specific areas.

"Everybody thinks that if we are so smart and can figure out how a game like chess is played or how we speak a language then this knowledge can be programmed into a computer," says Steve.

"What they are forgetting is the fact that it takes an entire lifetime to learn how to speak a language properly, and words used with certain looks and certain expressions will not necessarily mean the same to another person unless you have all grown up in the same world. Computers cannot be taught all that.

"How can a computer create music? After all for a person to decide what is good music involves all of the perceptions of our life, like all the joys and the sadnesses, and the exhilarations. This is what you sense when music is being played and so a computer that has never lived a life could never make that judgement.

"So I think a computer basically needs a simple program that just allows it to accumulate knowledge very slowly throughout its life.

Tessler's Law

"But I will not try to define what an intelligent machine is to me, because it turns out that with any definition today the computer is nowhere near it. There is a thing called Tessler's law — which is actually named after a guy who works at Apple — which says that any time a function is thought to be intelligent and is then programmed into a computer, the definition of intelligence is modified to exclude it — and that has been going on for a couple of decades now," comments Steve.

Three years ago Steve had what you might call a bad year. His marriage fell apart. He was in a plane crash. And he finally faced up to the fact that he was not a "Run Over People type person or a Run An Organisation type person".

He left Apple.

Complete change?

Throughout 1982 and quite a lot of 1983 he was the driving force behind two festivals aimed at proving that rock music and information technology could be soul-mates. How successful this attempt at fusing the two ideologies was is debatable. On the one hand Steve lost $21 million of his own fortune, but on the other some of the hundreds of thousands of people who attended the festivals DID make good use of the technology tent.

At any rate Steve looks on this period as a very positive phase of his life. So positive in fact, that last summer (1983) saw his return to Apple. But this time things are different, as he is working on his own as part of the engineering research and development team in Apple's personal computer system division.

From being the catalyst who revolutionised an entire industry his role has dwindled to that of a cog, admittedly a cog who can work in any direction he pleases — in a very large machine.

"There is a machine that I want to build that can calculate pi to a billion digits. And I know how to do it!

"I have also got some software projects I want to work on, and I could do pretty much all of this work at home. But I am here because I want to be part of Apple," Steve explains.

Idyllic as this may sound, in reality Steve is perhaps trying to blow out his bohemian image. Pi to a million digits or not, his first work back at Apple is on major projects with a project direction defined by the marketing department.

"But I really do want to do a couple of my own projects. I could not sit down and have them totally defined by the marketing department who are deciding what the people out there want. I'd rather look at the chips and see what the chips tell me to do," he adds.

'As a design style you start to look at the chips, the timing diagrams and how many fancy special features they need to get higher performance. I find that the chips tell me how many dots there should be across the screen or what colours are needed much better than if I look at a person in their living room and ask yourself 'what do they want'."

As they say, Steve, "When the chips are down . . ."

TALKING ABOUT games, Steve says: "Whether the people who write video and computer games are becoming stars in their own rights, I don't think the jury's in yet.

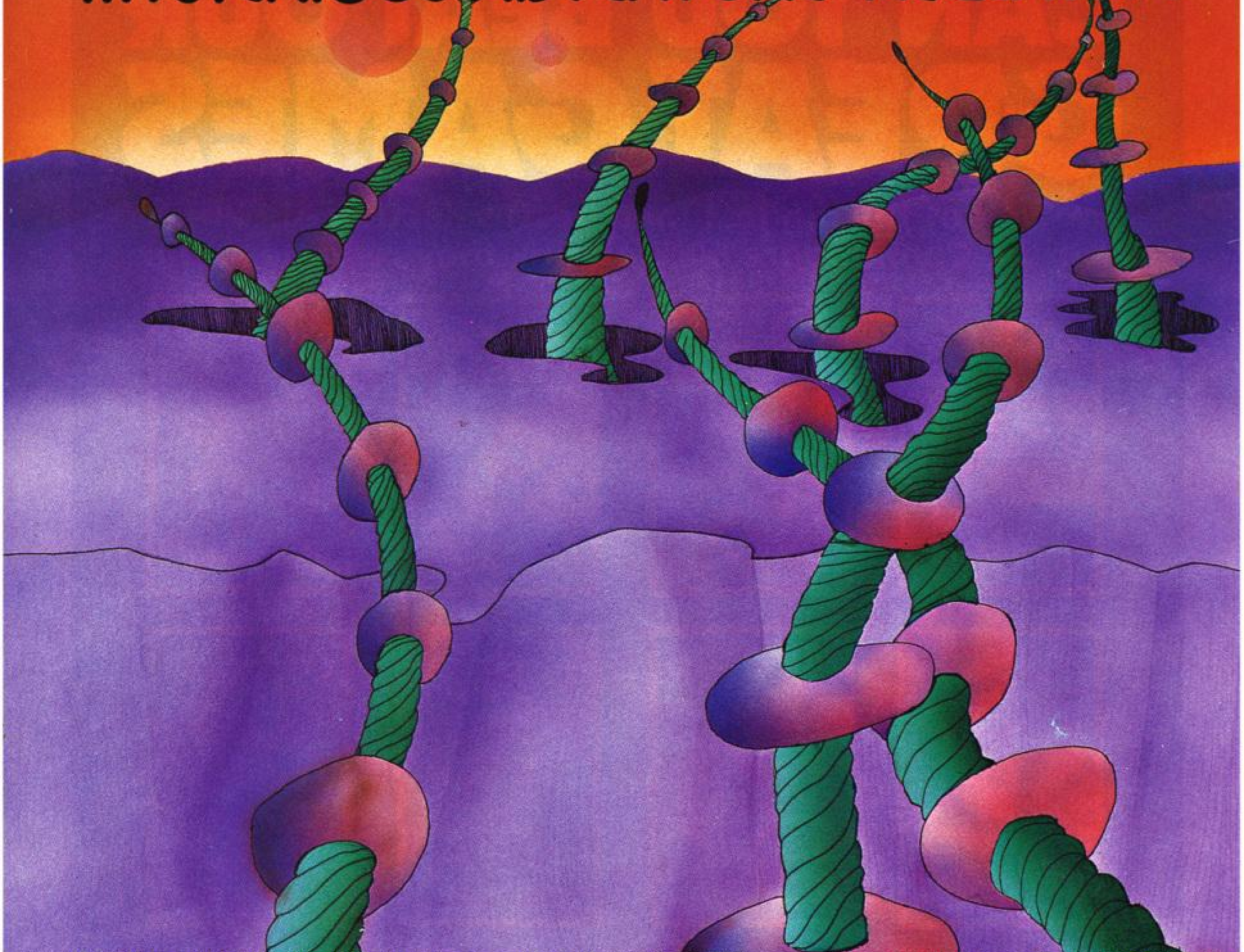
"The record company people that are consulting with software distributors feel that this is one of the many aspects which is going to be similar to the music business. And there has been some stardom for the video game software writers — you know, even I am in awe of some of them.

"Some companies are now deliberately trying to make stars out of their software artists — but this process is still too disorganised and fragmentary. And although a lot of money is being spent in making stars, I still believe that the ones who write the best programs will be the stars and not the ones that the companies are focussing on."



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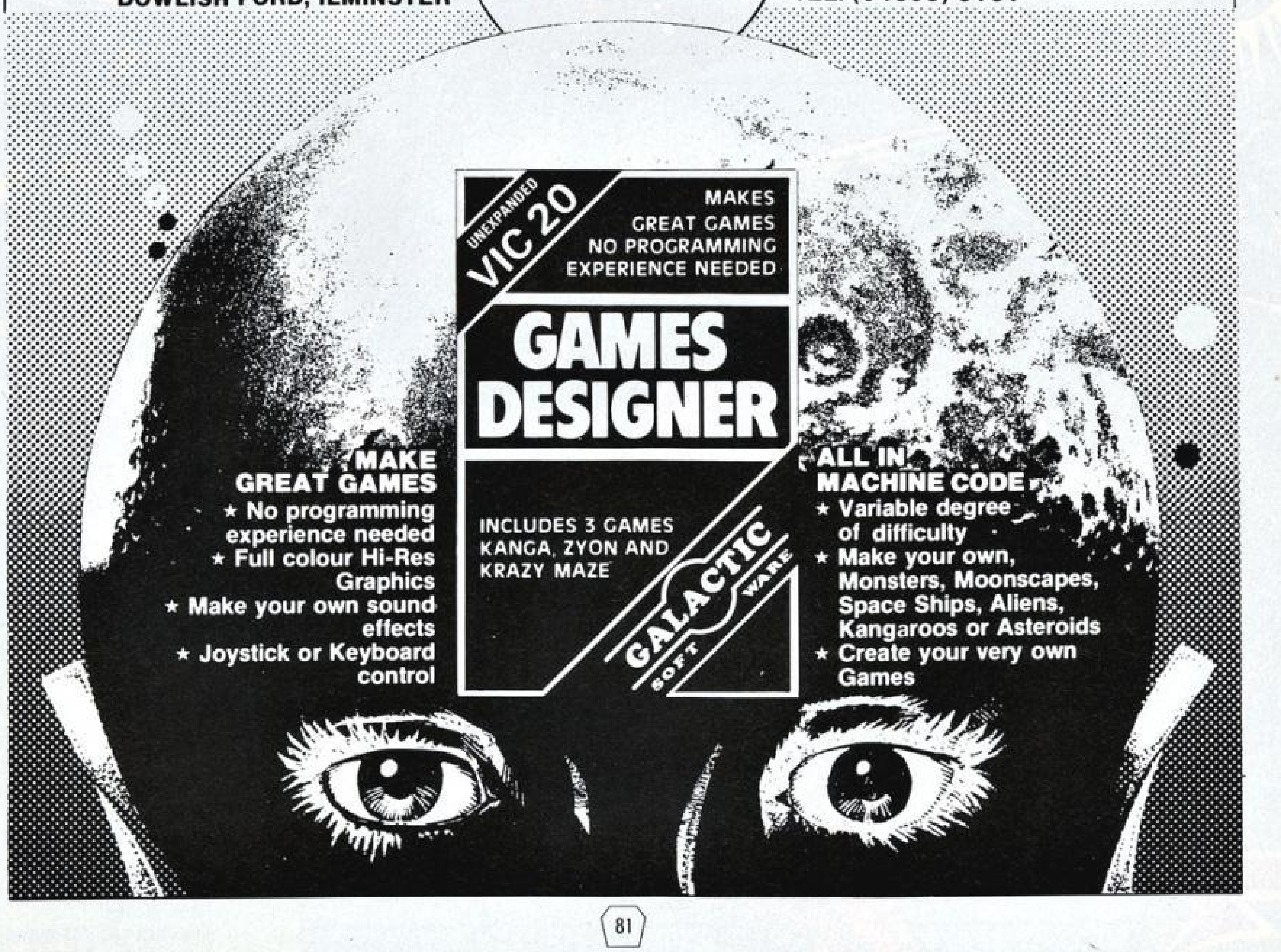
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HINT: Keep your nerve and wait as long as possible — the droids will conglomerate and can be obliterated ("zapped").

ILLUSTRATION: ROBIN SMITH

CONTROLS

Cursor keys move you.
Ø fires your pistol.

VARIABLES

x,y	your co-ords.
x(),y()	droids' co-ords.
d()	if 1 then droid is an ex-droid.
bu	bullets.
dr	number of droids.
m	move number.
p	direction you last moved — compulsory angle of fire.

ESCAPE

by ANTONY TRENKER

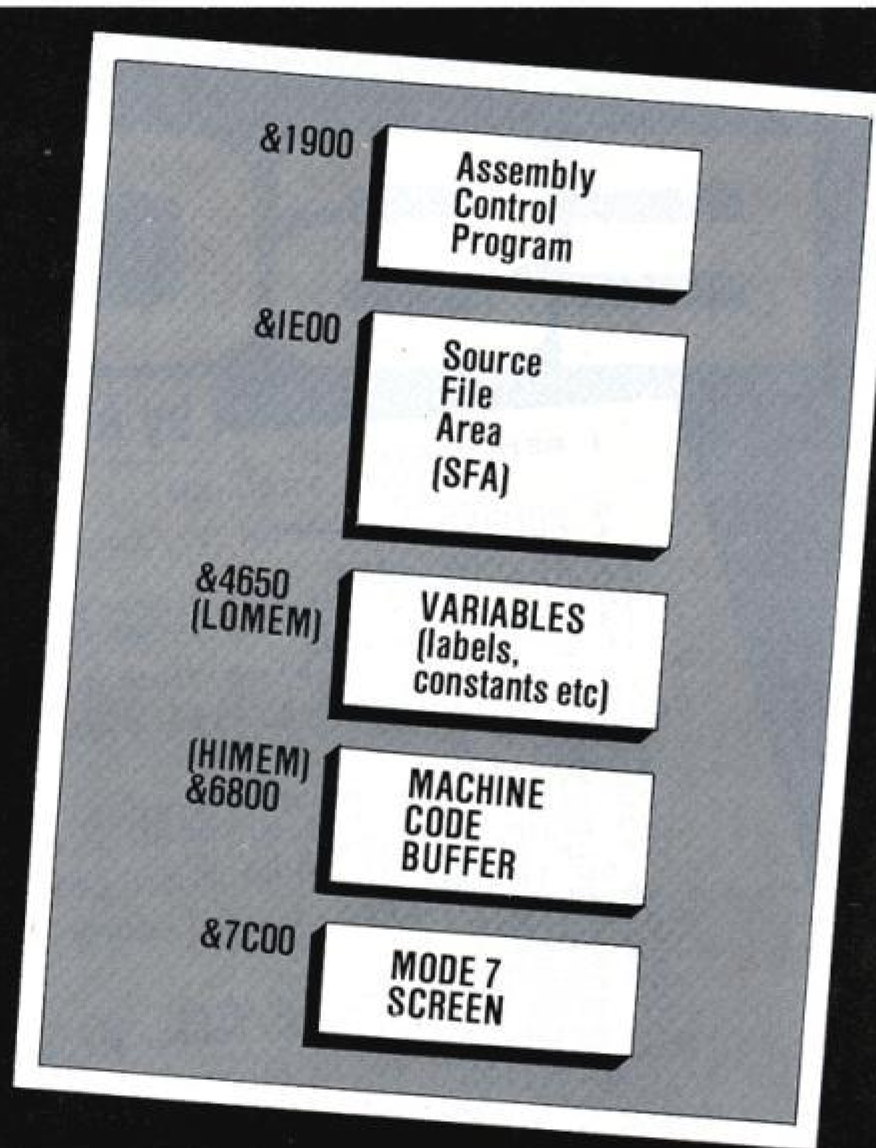
```
   1 REM COPYRIGHT ©
        ANTONY TRENKER
        1983
   3 BORDER 0: PAPER 1: INK 7
   4 CLS
   5 GO SUB 9000
  10 FOR b=y+5 TO 145 STEP 5
  12 PLOT OVER 1;x,b: DRAW 0,2
  13 BEEP .001,30
  14 IF POINT (x,b)=0 THEN LET a
=x: GO TO 50
  16 PLOT INVERSE 1;x,b: DRAW IN
VERSE 1;0,2
  18 NEXT b
  19 RETURN
  20 FOR a=x+5 TO 245 STEP 5
  22 PLOT OVER 1;a,y: DRAW 2,0
  23 BEEP .001,30
  24 IF POINT (a,y)=0 THEN LET b
=y: GO TO 50
  26 PLOT INVERSE 1;a,y: DRAW IN
VERSE 1;2,0
  28 NEXT a
  29 RETURN
  30 FOR b=y-5 TO 10 STEP -5
  32 PLOT OVER 1;x,b: DRAW 0,-2
  33 BEEP .001,30
  34 IF POINT (x,b)=0 THEN LET a
=x: GO TO 50
  36 PLOT INVERSE 1;x,b: DRAW IN
VERSE 1;0,-2
  38 NEXT b
  39 RETURN
  40 FOR a=x-5 TO 10 STEP -5
  42 PLOT OVER 1;a,y: DRAW -2,0
  43 BEEP .001,30
  44 IF POINT (a,y)=0 THEN LET b
=y: GO TO 50
  46 PLOT INVERSE 1;a,y: DRAW IN
VERSE 1;-2,0
  48 NEXT a
  49 RETURN
  50 FOR f=1 TO n
  52 IF a=x(f) THEN IF b=y(f) TH
EN LET d(f)=1: LET dr=dr-1: BEEP
 .2,-40: FOR a=x(f)-2 TO x(f)+2:
 PLOT INVERSE 1;a,y(f)-2: DRAW I
NVERSE 1;0,4: NEXT a: RETURN
  56 NEXT f
  58 STOP
 100 IF INKEY$="5" THEN IF x>10
THEN LET p=40: FOR a=x TO x-10 S
TEP -2: GO SUB 800: LET x=a: GO
SUB 800: NEXT a: GO TO 200
 110 IF INKEY$="8" THEN IF x<240
THEN LET p=20: FOR a=x TO x+10
STEP 2: GO SUB 800: LET x=a: GO
SUB 800: NEXT a: GO TO 200
 120 IF INKEY$="7" THEN IF y<150
THEN LET p=10: FOR a=y TO y+10
STEP 2: GO SUB 800: LET y=a: GO
SUB 800: NEXT a: GO TO 200
 130 IF INKEY$="6" THEN IF y>10
THEN LET p=30: FOR a=y TO y-10 S
TEP -2: GO SUB 800: LET y=a: GO
SUB 800: NEXT a: GO TO 200
 140 IF INKEY$="0" THEN IF bu>0
THEN LET bu=bu-1: GO SUB p: GO T
O 200
 150 IF x=130 THEN IF y=150 THEN
IF INKEY$="7" THEN GO TO 600
 190 GO TO 100
 200 LET m=m+1
 205 FOR f=1 TO n
 210 IF d(f)=1 THEN GO TO 270
 215 GO SUB 900
 220 IF x(f)<x THEN IF POINT (x(
f)+5,y(f))=0 THEN LET x(f)=x(f)+
5
 230 IF x(f)>x THEN IF POINT (x(
f)-5,y(f))=0 THEN LET x(f)=x(f)-
5
 240 IF y(f)>y THEN IF POINT (x(
f),y(f)-5)=0 THEN LET y(f)=y(f)-
5
 250 IF y(f)<y THEN IF POINT (x(
f),y(f)+5)=0 THEN LET y(f)=y(f)+
5
 255 GO SUB 900
 260 IF x(f)<x+6 THEN IF x(f)>x-
6 THEN IF y(f)<y+6 THEN IF y(f)>
y-6 THEN GO TO 700
 262 IF POINT (x(f),y(f)-2)=0 TH
EN LET d(f)=1: LET dr=dr-1: BEEP
 .1,-30: GO SUB 900: FOR a=60 TO
 20 STEP -1: BEEP .001,a: NEXT a
: BEEP .01,0
 270 NEXT f
 280 BORDER 1
 282 FOR a=30 TO 50
 284 BEEP .0004,a
 286 NEXT a
 288 BORDER 0
 300 PRINT AT 0,1;"BULLETS "; FL
ASH 1; INK 3;" ";bu;" "
 310 PRINT AT 1,1;"DROIDS  "; FL
ASH 1; INK 4;" ";dr;" "
 330 PRINT AT 0,18;"HOLES  "; F
LASH 1; INK 5;" ";INT (n/3);" "
 340 PRINT AT 1,18;"MOVES  "; F
LASH 1; INK 4;" ";m;" "
 390 GO TO 100
 600 BORDER 2
 610 PRINT AT 3,9;"SCORE = ";INT
 (10*(dr+1)*(20/m)*5*(bu+1))+200
0
 620 PRINT #1; FLASH 1;"''''''''
Y'O'U''''''W O N .''''''''''''''
": REM 16 dashes
 630 PRINT #1;"Press any key to
play again....."
 640 GO TO 750
 700 BEEP 1,-30
 710 PRINT #1; FLASH 1; INK 4;"
''''''Y'O'U''''''''''D I E D
": REM 16 dashes
 715 PRINT AT 3,9;"SCORE = ";INT
 (10*(dr+1)*(20/m)*5*(bu+1))
 720 PRINT #1;"Press any key to
play again....."
 750 IF INKEY$="" THEN PAUSE 1:
BORDER 1: BORDER 0: BORDER 0: BO
RDER 0: BORDER 4: GO TO 750
 790 RUN
 800 INK 5: BEEP .0001,65
 801 PLOT OVER 1;x-2,y-2
 802 DRAW OVER 1;4,0
 810 PLOT OVER 1;x,y-2
 812 DRAW OVER 1;0,4
 820 PLOT OVER 1;x-2,y
 822 DRAW OVER 1;1,1
 824 DRAW OVER 1;0,1
 830 PLOT OVER 1;x+2,y
 832 DRAW OVER 1;-1,1
 834 DRAW OVER 1;0,1
 850 INK 7
 890 RETURN
 900 PLOT OVER 1;x(f)-2,y(f)
 902 DRAW OVER 1;4,0
 904 DRAW OVER 1;-1,1
 906 DRAW OVER 1;0,1
 908 DRAW OVER 1;-2,0
 910 DRAW OVER 1;0,-1
 920 PLOT OVER 1;x(f)-1,y(f)-2
 922 DRAW OVER 1;2,0
 924 DRAW OVER 1;-1,1
 990 RETURN
9000 REM set up
9010 LET x=INT (RND*23)*10+10
9015 LET m=0
9020 LET y=20
9030 LET p=10
9050 INPUT "NUMBER OF DROIDS ";n
9055 IF n>40 OR n<1 THEN BEEP .5
,0: GO TO 9050
9057 LET dr=n
9060 DIM x(n): DIM y(n): DIM d(n
)
9070 LET bu=INT (n/4)
9080 FOR d=0 TO 20
9082 PRINT AT d,0; INK 0;"█
                              █"
9084 NEXT d
9090 PRINT AT 2,0; INK 0;"█"; IN
K 5;"▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄
▄"; INK 0;"█"
9092 PRINT AT 21,0; INK 0;"▀▀▀▀▀
▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀█"
9100 FOR f=1 TO n
9110 LET x(f)=INT (RND*47)*5+10
9120 LET y(f)=INT (RND*28)*5+10
9130 GO SUB 900
9140 BEEP .01,30
9150 NEXT f
9200 FOR f=1 TO n/3
9210 LET a=INT (RND*23)*10+10
9220 LET b=INT (RND*14)*10+10
9240 CIRCLE INK 5;a,b,2
9250 NEXT f
9900 GO SUB 800
9910 GO TO 300
```

WARNING: Reading this page without prior knowledge of simple machine code principles may — nay, will — damage your health

Goad that code the 6502 way!

In the first of a three-part series, BIG K Technical Editor ANDY GREEN lays down the lowdown on how to write smoo-oo-ooth machine code routines for the BBC and other 6502-driven micros.





THIS SERIES of articles describes how to use a BBC computer to write machine code (especially games!) for either the BBC itself, the Oric-1 or a Commodore 64.

Yeah, they're all 6502 machines, reason being that the BBC assembler only works on 6502 code. Besides, the 6502 is a great chip, its code being faster, neater and in the long run, more compact than Z80 (that should stir up all the spectrum programmers out there . . . vive la 6502!).

The bad news is that you've got to have a disc drive, for reasons of speed and flexibility, as well as OS 1.2 and BASIC II. Both the latter ROMs are now available (at least) from most BBC stockists off the shelf.

With the BBC, a disc drive and (if you need it) a target micro you can write smooth, professional games. The first two articles in this series will deal with setting up your system, and the rest of the series will be devoted to letting slip trade secrets on how to get smooth, fast graphics.

Tricky Transference

How this system works . . . Assembly code is entered and edited solely on the BBC. When the time comes to assemble, the excellent built-in BBC assembler is used. The resultant machine code is first put in a buffer, then (unless you're assembling for the BBC itself) dumped into the memory of the target micro (in this case a Commodore 64 or Oric). The transferring of the machine code is the tricky bit, one that will be covered in due course. Meanwhile I'll get on with explaining just how the assembly system is going to work.

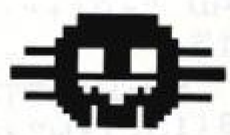


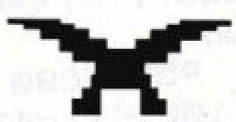
FIG.2

```
>*LIST !BOOT
  1 *KEY 0 *FX4,0|MMODE7|M
  2 *KEY 1 LIST|N|M|O
  3 *KEY 2 RUN|M
  4 *KEY 3 GOTO30000|M
  5 *KEY 4 *LOAD OBJ 1900|M*TAPE|MP%=&A0
1:[OPT2:LDY#0:.R1 LDA(&70),Y:STA(&72),Y:I
NY:BNER1:INC&71:INC&73:LDA&71:CMP#&7C:BNE
R1:RTS:]|M!&70=&E051900:CALL&A01|MCALL&E0
5|M
    6 *KEY 8 PAGE=&1E00|M
    7 *KEY 9 PAGE=&1900|M
    8 *KEY 10 OLD|M*FX12,2|M
    9 MODE7:P." Greenie's Assembling Syste
m says 'Hi!'"''TAB(15);CHR$141;CHR$131;"E
XAMPLE"'TAB(15);CHR$141;CHR$131;"EXAMPLE"
;TAB(0,20);:*LOAD A 1900
```

Listing of !BOOT file. Note you should leave out the *KEY 4 definition if you are writing for Commodore 64/ORIC

The BBC's memory is subdivided into four parts, plus the Mode 7 screen memory, as shown in Fig (1). To get over the lack of memory, your assembly code is stored as one or more BASIC files on a disc, each of which are swapped into the Source File Area (SFA), form &1E00 to LOMEM, as the Control program needs them. The Control program starts at &1900, so that it isn't overwritten by the swapping, and you can flip between the Control program and the last program to be loaded into the SFA by using function keys f9 and f8 respectively.





Separate Files

On Delta 4, for example, there was a separate file for each of the four game parts, and another couple to look after the title page and high scores. If after assembly I found a bug (not too unusual an occurrence) in the 'Invaders' part I would hit f8 to make sure I was in the SFA, then load in the INVADE (geddit?) file, make any changes using BASIC and save the file back to disc using f3 (see later) — NOTE THAT YOU MUST SAVE THE FILE TO DISK BEFORE ASSEMBLING!! This is because the Control program reloads each program as it needs it! I could then reassemble by pressing f9 to get back to the Control program and f2 to RUN the control program.

The string at line 310 in the Control program, Fig (3) and (4), contains the names of the files that the assembler is to, er, assemble, in order. Each filename must be six characters long and preceded by a space; although the last filename consists of just an asterisk. Zero page labels, i.e., labels with a value of less than 256, *must* be defined before they are used; so it may be a good idea to have a first file that contains all the label definitions, together with any static (read-only) lookup tables you may need in your program (e.g., a table containing the address of the first byte on each line of the screen, which wouldn't change throughout the program).

Each of the source files is only allowed to get so large, about 9K, before you have to start another file. As you can see from Fig (1), this is because the variables need some space too! With extremely large assembly programs, there may be too many variables to fit in the space allocated between LOMEM and HIMEM. Don't be too concerned, however, since THEM contains 20K of finished machine code and data tables (about 70K of source — gasp) and didn't have any trouble. In fact, you're more likely to run out of disc space than variable space, if careful with the length of individual files, and keep the variable names short and to the point.

My Favourites

To set up a disc, format it, and *BUILD a !BOOT file as in Fig (2): You'll notice this contains function key definitions for f0 to f3 as well as f8 and f9. f0, f1 and f2 are simply my favourite keys for clearing the screen, listing the program in page mode and running the program, and you can easily change these to your own favourites.

However, the definition for f3 should be included on one of the function keys as this performs as 'Auto Save' on source files. It clears the screen, prints up the name of the file and waits. Type an upper case "Y" and [Return] to save the file. Anything else and it goes back to the BASIC prompt. This is a — sigh — recent addition, included after typing SAVE"MISSIL" at two o'clock in the morning when meaning to save INVADE. This led to two files containing the INVADE

FIG.3

```
>LIST
   10REM "Control for BBC - GRUN 84
   20HIMEM=&67FF:LOMEM=&4650:CLEAR:?&FE6
2=&FF:?&FE60=0:LOMEM=&4650
   30ON ERROR CLOSE#0:PRINT'':REPORT:PRI
NT;" at line ";ERL:END
   40MODE7:PRINT'"Now assembling:":Y%=4
   50P%=&E05:Z%=0:W%=1
   60FILE$=" EXAMPL*"
   70A$=MID$(FILE$,W%,7):IFA$="*"THEN110
   80A$=RIGHT$(A$,6):PRINTTAB(0,2+W%/7);
A$;" Pass ";-(Y%<>4)+1;:W%=W%+7:OSCLI "L
OAD "+A$+" 1E00":O%=&6800:PAGE=&1E00:GOT
O10
   90PRINTTAB(30,0);~O%:IFY%=6THENPRINTT
AB(15,1+W%/7);"Sending";:?&C00=H%:!&C01=
&6800:!&C05=(O%-&6800):!&C09=Z%:X%=0:Y%=
&C:A%=1:CALL&FFD1:Z%=Z%+(O%-&6800):GOTO7
0
  100GOTO70
  110IFY%=4THENY%=6:H%=OPENOUT("OBJ"):GO
TO50
  120CLOSE#H%:PRINTTAB(0,20);"Done":END
```

Listing of BBC control program. Note you must use same line numbers

source code and a heart-breaking lack of a 5K file called MISSIL. After the red mist had cleared from my eyes (and that was no VDU19,0,1,0,0,0 !), I created f3 and swore that I'd never 'SAVE' a source file again (and I swore some more anyway, just for the hell of it).

If you are writing programs that will run on the BBC itself then also define f4, else leave it out. The use of this key is explained later. After creating the !BOOT file, type *OPT4,3 so the disc knows it must auto-boot with shift-BREAK.

Now you must type in the Control program, but first of all decide which version you need. If you are going to write programs for the BBC itself, then type in the listing in Fig (3). If you intend to write for the Oric or Commodore 64 then type in the listing in Fig (4). Once you've typed it in, save it to disk with the filename "A".

The hardware details of how to link up the Commodore 64 and the Oric to the Beeb will appear next month (don't worry, the hardware is really simple), but to round off this month's section I've got details of the standard format for each source file for you.

Include REM

Each source file starts at line 10 (see Fig (5)) with a REM statement and the name of the program. This is from where each file is executed by the Control program, so it must be included. Line 100 indicates the start of the assembly code, which can go on until line 9998. Line 9999 indicates that we're back in BASIC and returns to the Control program. Line 30000 is used with f3 and the filename inside the OSCLI statement MUST BE THE NAME OF THE FILE!!! (Since this is the filename used with the auto-save function.) It appears twice, once in the PRINT statement and once in the OSCLI statement. Be sure to set both correctly.

(For those who haven't met it before, the OSCLI command on BASIC II sends a string to the Command Line Interpreter. The string can include Basic expressions, eg CHS$(42), and should be formatted as if it were a * command, e.g. as OSCLI ("FX12,"+STR$(A%)) would, if A% had the value 2 to the equivalent of *FX12,2.)

CALL SYS

You can use Key f4 to execute the object code after assembly, if the code is designed for the BBC, or use CALL or SYS on the Oric or Com 64.

Over the next few months we'll take apart a game and cut it into chunks, one chunk a month. Next month I'll have an overview of the game, details on cables to connect up your Beeb and programs for the Com 64 and Oric to accept the object code from the BBC. Each part of the game will appear in three listings, one for BBC, one for C64 and one for Oric.

MORE NEXT MONTH

FIG.4

```
>LIST
   15REM "Control for C64/Oric - GRUN 84
   20HIMEM=&67FF:LOMEM=&4650:CLEAR:?&FE6
2=&FF:?&FE60=0:LOMEM=&4650
   25FORY%=0TO3STEP2:P%=&A01:[OPTY%
   30.TROUT SEI:LDA#&FF:STA&FE62:LDA&FE6
C:ORA#16:STA&FE6C:LDA&FE6D:AND#239:STA&F
E6D:LDX#10
   35.X0 LDA#0:JSR SEND:DEX:BNE X0:LDA#&
FF:JSR SEND:LDA&70:JSRSEND:LDA&71:JSRSEN
D:LDA&72:JSRSEND:LDA&73:JSR SEND:LDY#0
   40.X1 LDA(&74),Y:JSRSEND:INC&74:BNEP%
+4:INC&75:INC&70:BNE X2:INC&71
   45.X2 LDA&71:CMP&73:BNE X1:LDA&70:CMP
&72:BNE X1:LDA#0:JSRSEND:CLI:RTS
   50.SEND PHA
   55.X3 LDA&FE6D:AND#16:BEQ X3:LDA&FE6D
:AND#239:STA&FE6D:PLA:STA &FE60:RTS
   60:]:NEXT
   65MODE7:PRINT'"Now assembling:":Y%=4
   70P%=&600:L%=P%:W%=1
   75FILE$=" EXAMPL*"
   80A$=MID$(FILE$,W%,7):IFA$="*"THEN100
   85A$=RIGHT$(A$,6):PRINTTAB(0,2+W%/7);
A$;" Pass ";-(Y%<>4)+1;:W%=W%+7:OSCLI "L
OAD "+A$+" 1E00":O%=&6800:PAGE=&1E00:GOT
O15
   90PRINTTAB(30,0);~O%:IFY%=6THENPRINTT
AB(15,1+W%/7);"Sending";:?&70=L% MOD256:
?&71=L%DIV256:?&72=(P%AND255):?&73=(P%DI
V255):?&74=0:?&75=&68:L%=P%:CALLTROUT:GO
TO80
   95GOTO80
  100IFY%=4THENY%=6:GOTO70
  105A%=1:CALLSEND:PRINTTAB(0,20);"Done"
:END
```

Listing of Control program for C64/ORIC option

FIG.5

```
LIST
   10REM EXAMPL
  100[OPTY%
  110       .
  120       .
  130       .
  140       .
  150       .
  160       .
 9999]:PAGE=&1900:GOTO90
30000MODE7:B$="":INPUT"Save Exampl? : "
A$:IFA$<>"Y"THENSTOP ELSE PRINTCHR$30;~P
AGE;~TOP:FORY%=0TO7:B$=B$+CHR$(Y%?&7C00)
:NEXT:OSCLI("SAVE EXAMPL "+LEFT$(B$,4)+"
 "+RIGHT$(B$,4))
```

Example source file. Line 10,100,9999 and 30000 must be included. Lines 110–9998 contain your code.

A New Dimension in Spectrum Hardware

Joystick and Interface

for Sinclair Spectrum with these features to give you endless hours of enjoyment.

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The interface supplied with the Quick Shot (TM) has a two joysticks facility.

The first port simulates 6789 & 0 keys. The second port simulates in (31) command. It will run any Software.

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3. Using in (31) i.e. Kempston.
4. Any Software you write yourself.

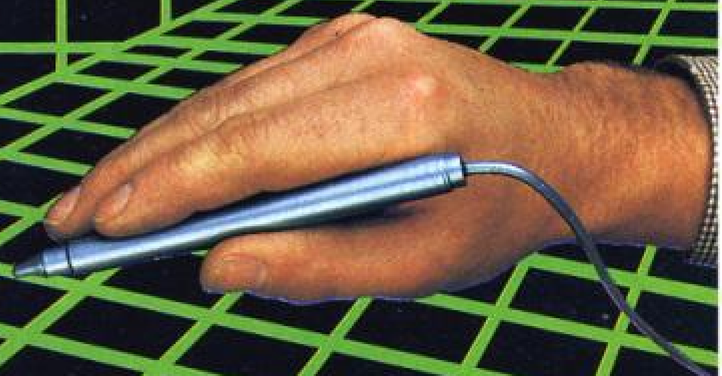


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The LIGHT PEN enables you to produce high resolution drawings on your own TV screen simply by plugging into the ear socket of your Spectrum. The controlling software supplied with the light pen has 16 pre-defined instructions. You can change colour (Border, Paper, Ink), draw circles, arcs, boxes, lines and insert text onto the screen at any chosen place, you can also draw freehand. There is a feature to retain the screens and animate. On the 48K Spectrum you can retain 5 screens. You can also use the machine code on its own in your own programs, for selecting out of a menu etc. The LIGHT PEN is supplied with a control interface, to adjust the sensitivity/pen alignment.

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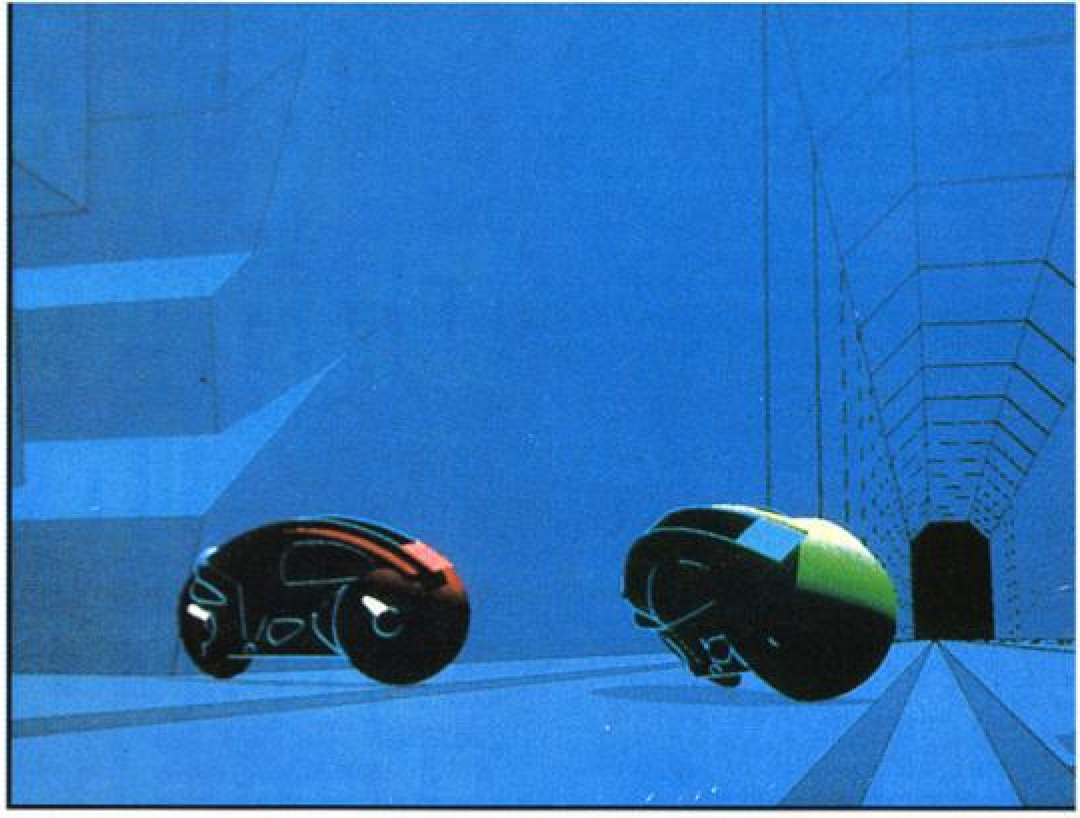
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So-called "Solid Modelling" can produce some unearthly effects. From the Fairchild A-10 tank-busting plane of 7th TAC to the megabikes from Tron.



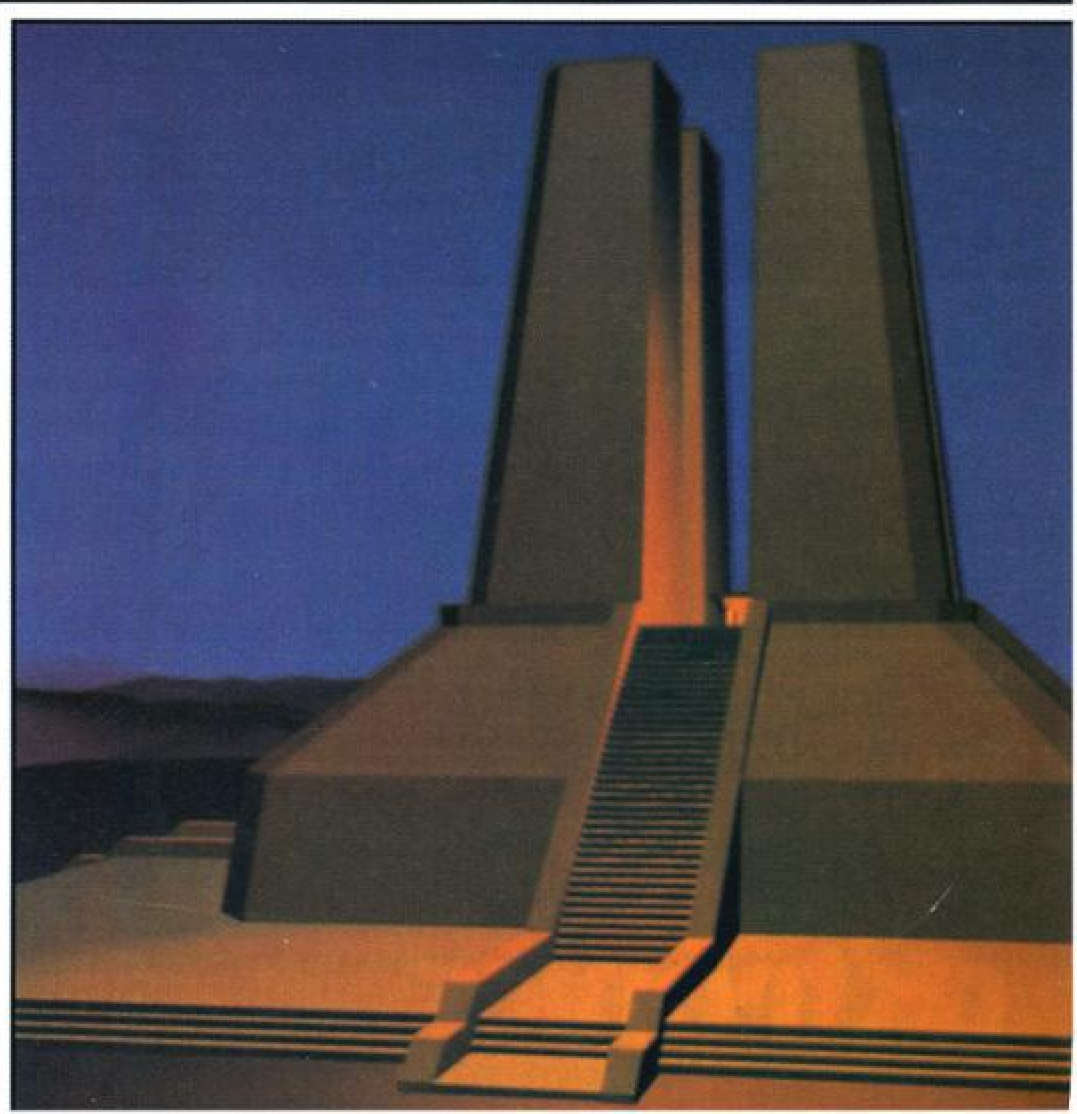
MIND

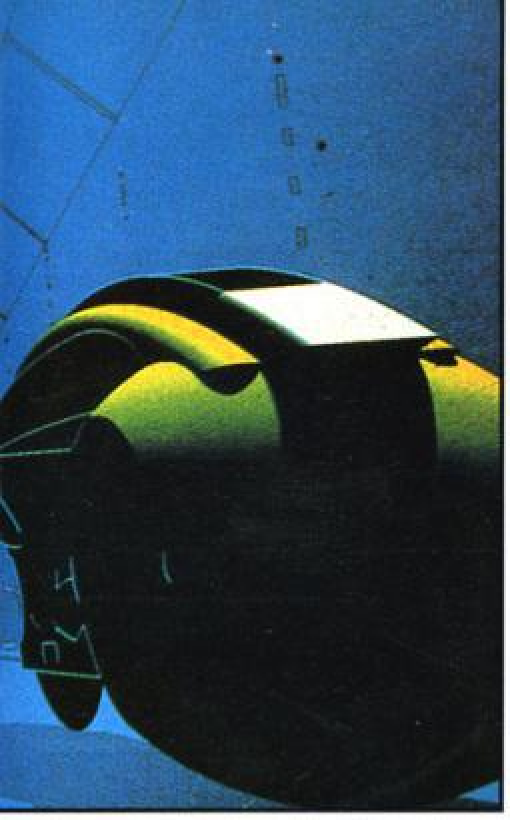
Three faces of the Art: (left) Mike Newman of Dicomed created Artist at Work *on a D38+ Design Station. (Below left): Dance tuition, Apple style. (Below): A Ziggurat on Mars courtesy Digital Productions. Where does the stair lead? Where will it all end?*

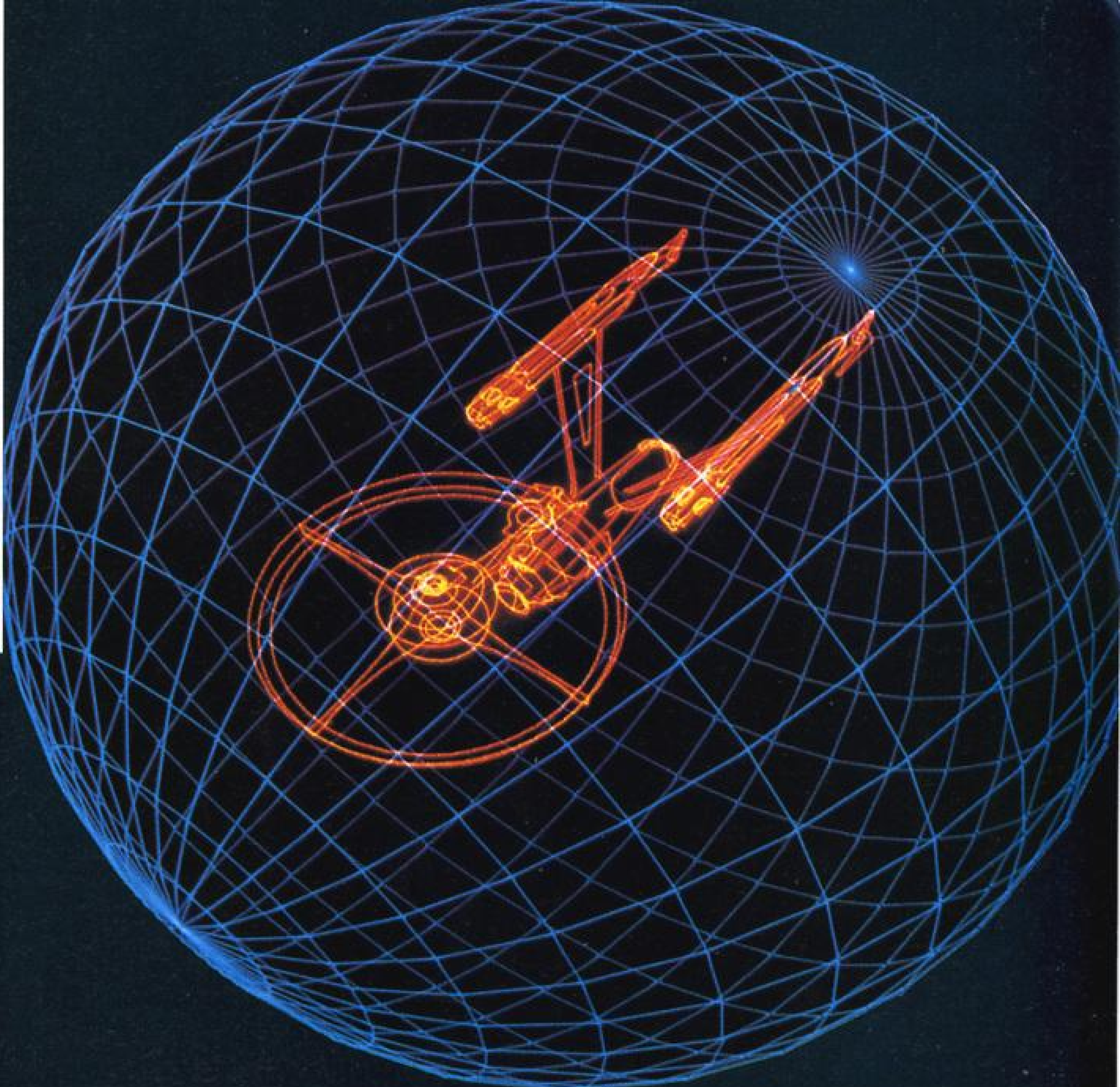
It's worth remembering, sometimes, when you're wrestling with a pixel grid or cursing your micro's rotten "high resolution", that in computer graphics — as much as anything else — you get what you pay for, and if you pay enough (it can run into six figures) what you get is a lot. Then, if you've got the skill and the time you can set about creating electronic imagery of the standard to be seen on these pages.

Solid modelling, ultra-high resolution, astonishing purpose-built equipment . . . all









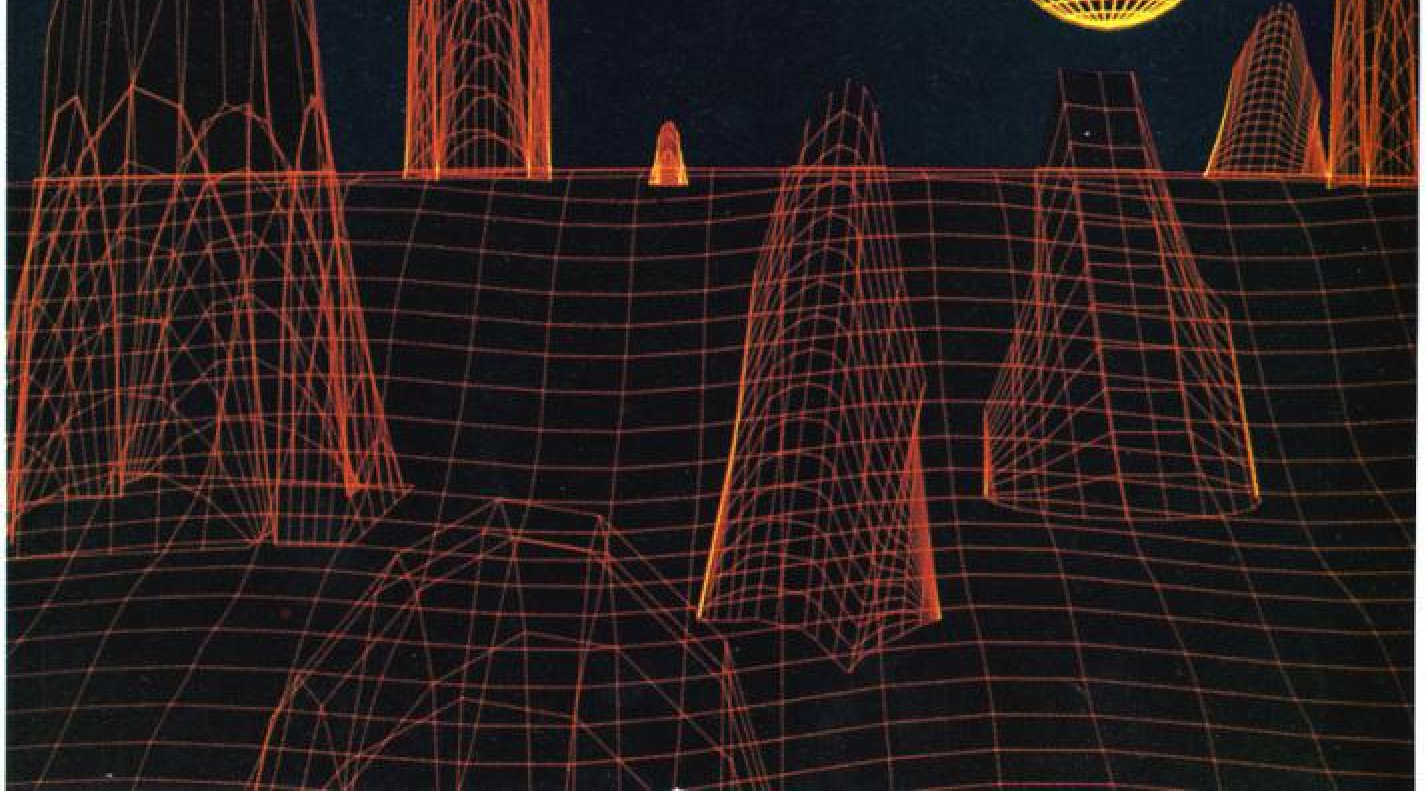
AMES

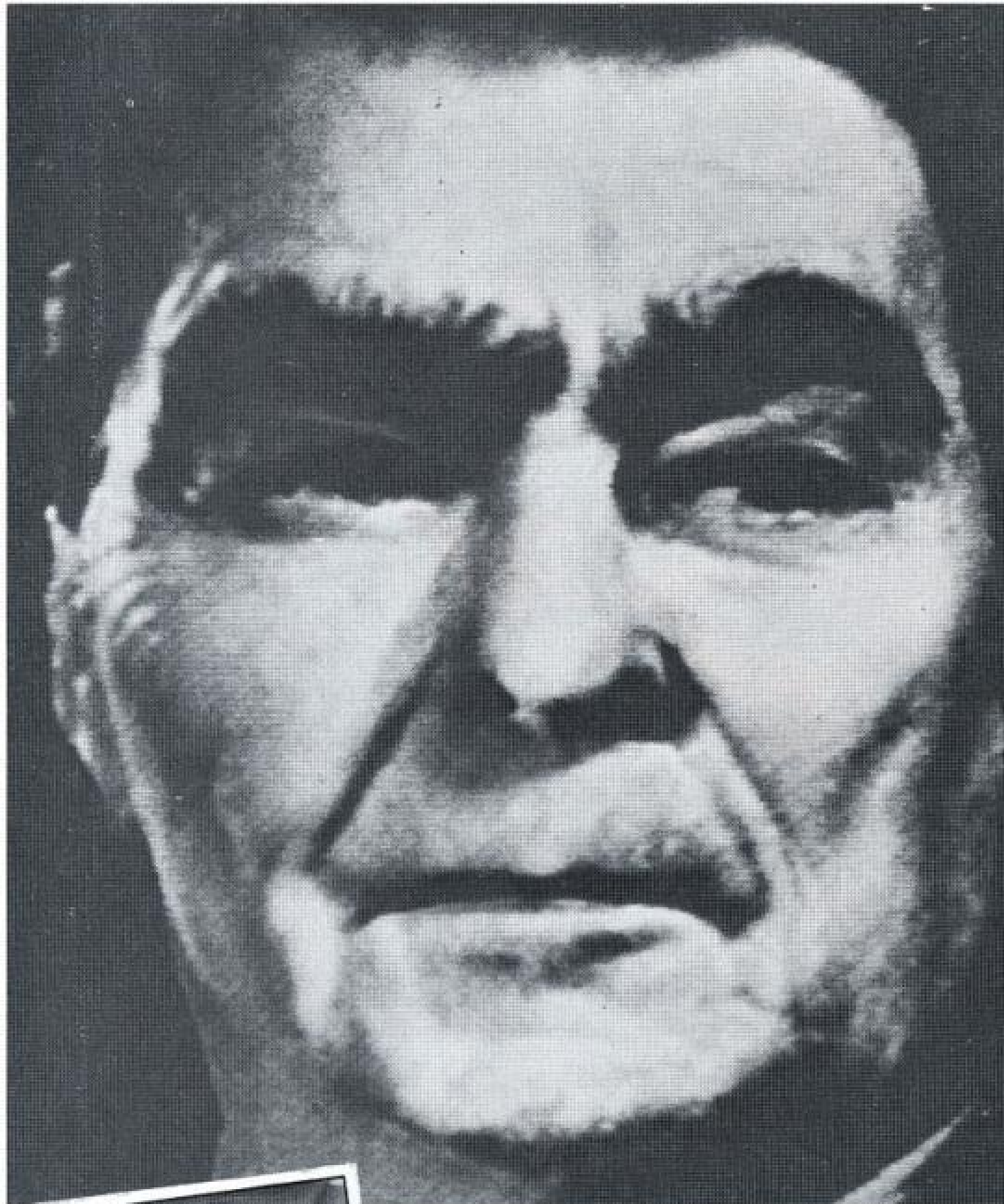
these, plus not a little professional expertise, are what it takes to produce the mind-boggling stuff now emerging from labs across the Western World.

PAUL WALTON has been looking through a new book (COMPUTER IMAGES: STATE OF THE ART by Joseph Deken). The state of this particular art, he reports, has never been higher . . .

"Now type CIRCLE and hope for the best" . . . One test of hi-res is the ability to draw curves without "stepping". How's this for starters?

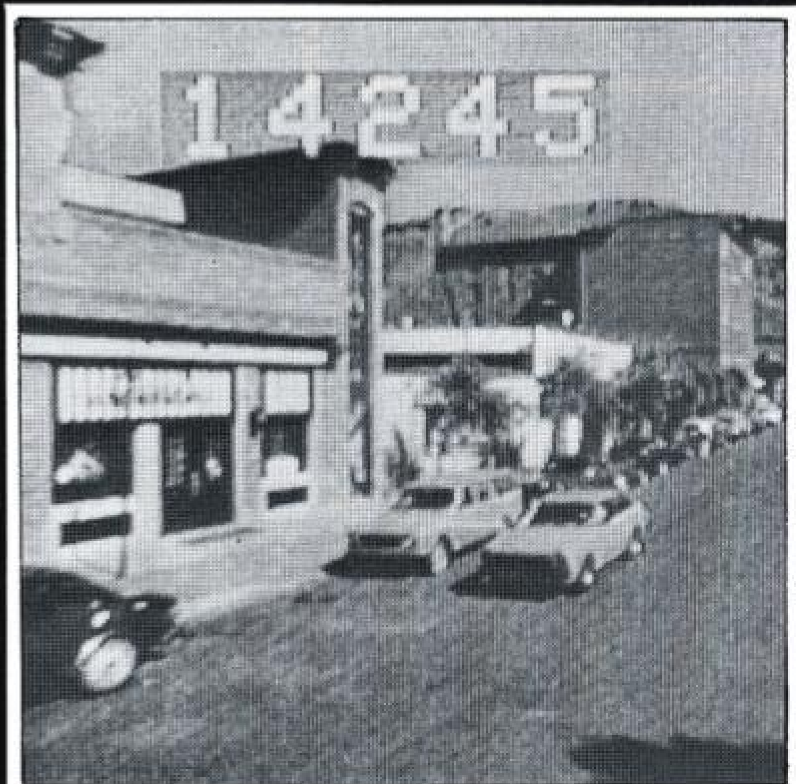








THE PRINCE OF ARMAGEDDON? The startling and evil image (left) was made by combining the faces of Reagan, Brezhnev, Mrs. Thatcher, Mitterrand and Deng Xiaoping in proportion to their national nuke stores. (Above): a cartoon comes as a relief.

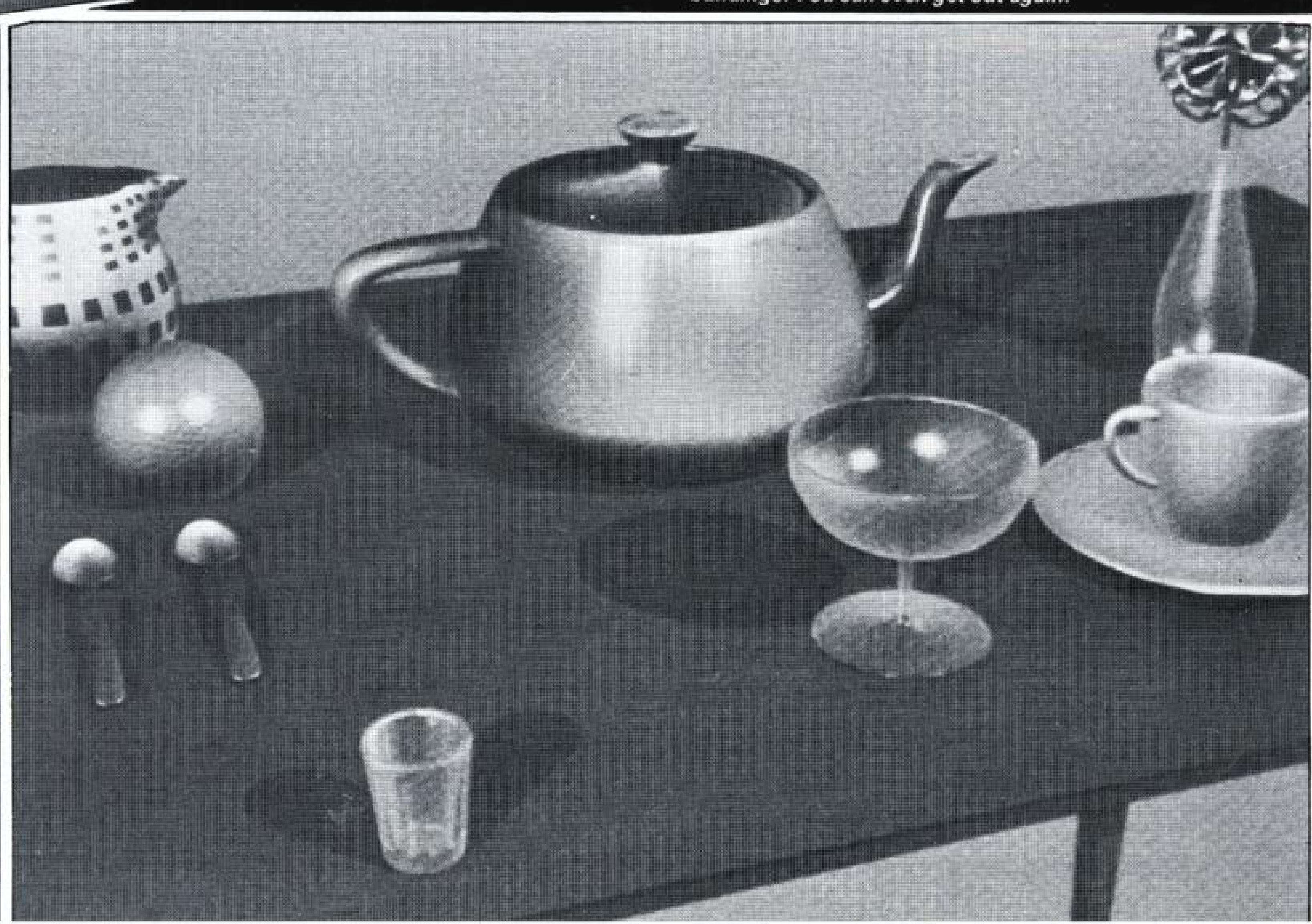


GHOST TOWN? The image above is no photo, but a computer model of a western town. You can even enter the various buildings. You can even get out again.



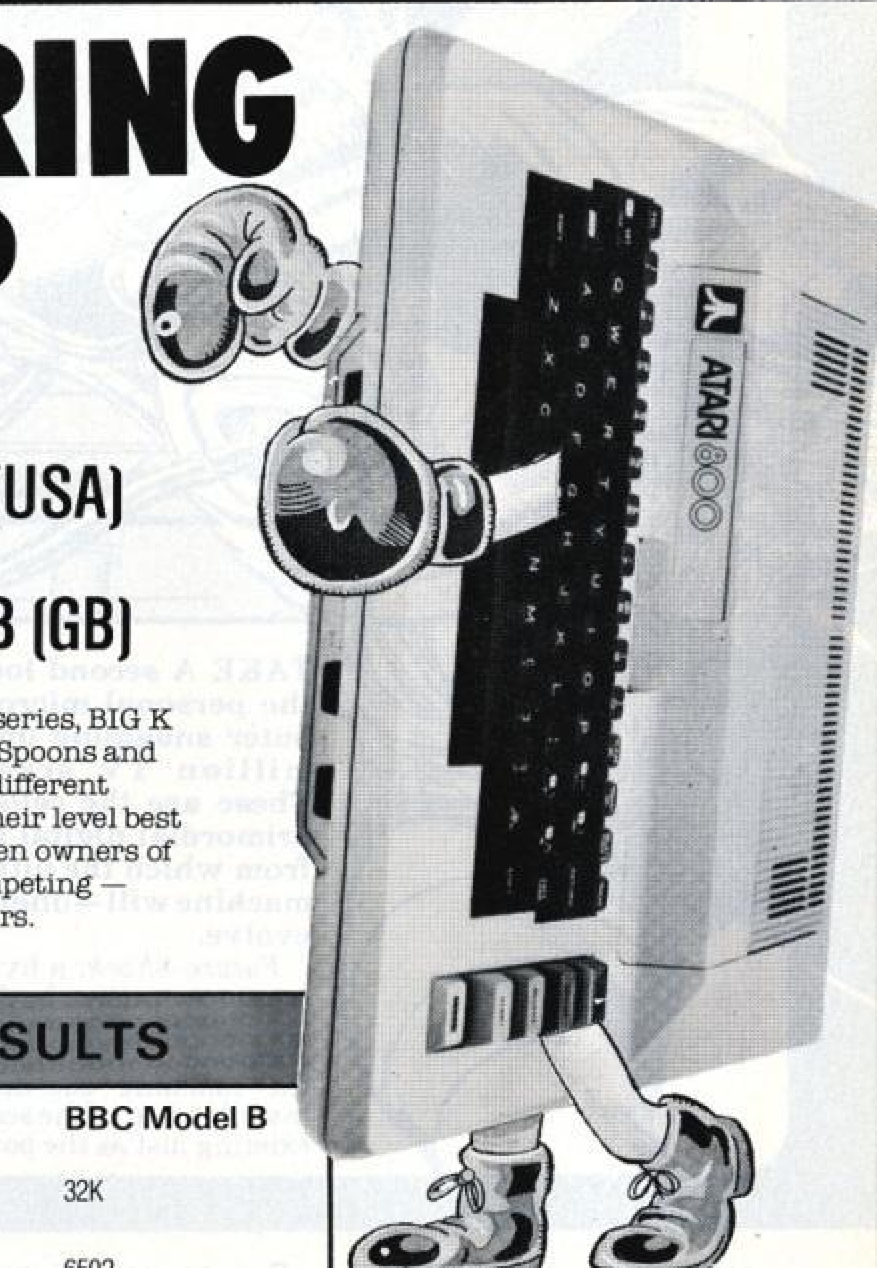
All the illustrations of computer graphics on these pages are taken from COMPUTER IMAGES: STATE OF THE ART by Joseph Deken, excellent value at £9.95. Grateful thanks to Thames & Hudson, publishers, for permission to use these extracts.

The Still Life to end all Still Lives: the image (right) was first drawn, then filled, finally given a ''real'' patina . . . all by computer. Beats a bowl of nuts?



SQUARING UP





ATARI 800 (USA) vs. BBC Model B (GB)

In the first of a random series, BIG K breaks out the Wooden Spoons and issues them to two different contributors — who do their level best to make bad blood between owners of equivalent — but competing microcomputers.

WEIGH-IN RESULTS

Atari 800		BBC Model B
48K	Memory	32K
6502	CPU	6502
no	expandable?	yes
yes	hi-res graphics?	yes
11	No. of Modes	7
255;16 max	colours	8
proprietory	peripherals	anybody's
1.8 mhz	clock speed	2.0 mhz
yes (predefined text window)	mix text/graphics?	yes (user-definable
via TV; 4 voices, 3 other parameters, 5 octaves	sound	internal; composite 4-voice parameters using ENVELOPE and SOUND stmts.
£200+	Typical price:	**£399**

IT'S NO BOOB TO BUY BEEB

says software designer BERNARD TURNER, opening strongly with a fact-filling pitch for Acorns's ever-expanding Wonder Widget in the slim buff case.

THE BBC 'B' micro has now been with us since December 1981. In that short time Acorn's best shot (so far) has created a tremendous reputation as *the* personal micro.

Why is this so?

To begin with, the Beeb 'B' is part of a system — designed from the outset by Acorn with this major advantage in mind. It therefore benefits from some enormous pros and pluses, primarily apparent in the 'future compatibility' concept embodied in *The Tube* — a device to allow two different and separate microprocessors to communicate at very high speeds.

In fact, Acorn plans to release, in all, three different microprocessors: a) another 6502; b) a Z80, and c) the new National Semiconductor 16032 chip.

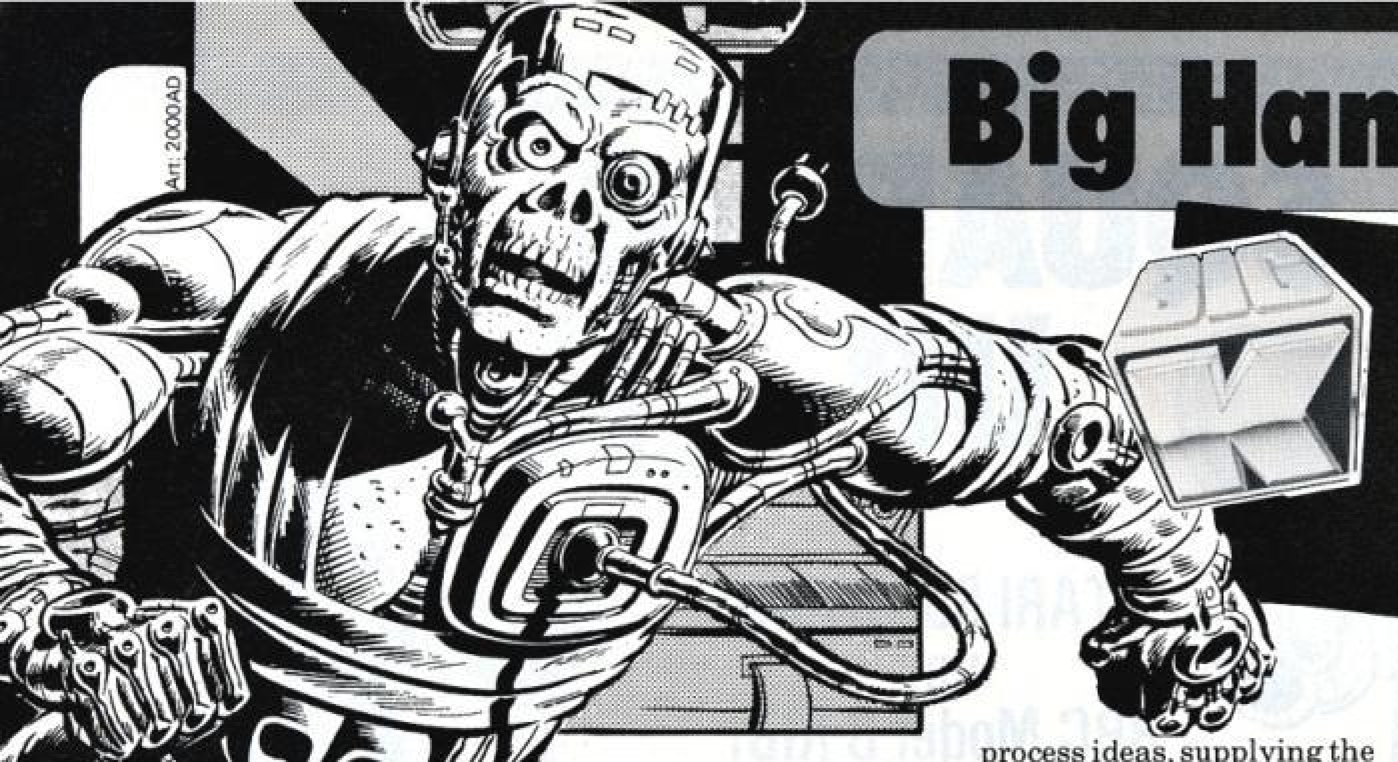
Acorn's choice of chips (say it fast) has — to my mind — been wise. Very wise. Why?

1) Compatibility with Acorn's existing (6502) software. 2) adoption of the 8-bit industry standard with the use of Z80 cp/m; 3) most importantly, a very powerful (arguably the best) 16-plus-bit chip in the form of the 16032 — which I feel is one chip we'll all be hearing a lot more of.

Akin to *The Tube*, is a very important piece of software called the Machine Operating System (MOS). The MOS's purpose is to look after the hardware — practical thinking on Acorn's part when they devised it, as they have therefore implemented 'Big Machine' philosophies in a micro. The direct benefits are super easy access to hardware through documented MO/S subroutines, and — not to be sniffed at — near-zero redundancy when the machine is upgraded. This also allows languages and utilities to be run with (relative) ease.

Then there's BBC BASIC — probably the best on any micro today. (Not only is it good — it's *fast*. Check the benchmarks!) Also ace — the built-in Assembler, and, of course, the support from suppliers such as Acornsoft, A&F, Bugbyte and Program Power (to name but a few). If you're looking for good stuff you don't have to look far and when you dig into your pocket, it generally isn't so deep as with some other suppliers, targeted on another well-known machine whose name begins with an 'A' — oh, all right — Atari.

Yes, the BBC 'B' has some



Big Hand for the

If you think what's happened in the last two years has been pretty good, you ain't seen nuthin' yet. Future Schlock by PAUL WALTON

TAKE A second look at the personal microcomputer snuggling up to a million TV screens. These are the cells, the primordial digital gloop from which the ultimate machine will—one day—evolve.

Future Shock, a hymn to tomorrow written by American star-gazer Alvin Toffler, describes a world in which the machine becomes an invisible part of the scenery; existing just as the power to process ideas, supplying the electricity which drives dreams.

A hand — well, it's a start — has already evolved. In Japan, as it happens. Hitachi, the Japanese industrial giant, has built the machine's robot hand which is able to flex unconstrained by its metal skin. Its eyes and ears are everywhere, gobbling up and digitising the flavour of the world's cultures. It began to talk in the last decade. It is starting to walk in this decade. It is expected to begin to "think" before the year 2000. After that? Well, check off a list of human bio-functions and form your own ideas.

Chips are now passé, as relatively unimportant in their way as the plug on your TV. Programming is becomming staid, as this generation of software and systems fall victim to the Intelligent Knowledge-based or "Expert" System. All sense of the personal microcomputer's size and shape is gently being tipped out of the window and — to mix metaphors — back into the Pre-Cambrian sludge.

pretty nifty specs. Most people have an interest in graphics, right? Right. In the case of the Beeb they have every reason to be. You have eight graphics modes, from resolution 640 x 256 (80 characters x 30) using 20K of memory (Mode 0), to the 80 x 75 (40 characters x 25) using 1K of RAM in Teletext Mode (7). Colour is dependent on screen mode (2 to 8). In Mode 2 you get eight (*not* 16 as claimed — the 'extra' eight are merely flashing opposites of the first set.)

Sound? Excellent with speech synthesis now available. Tape backup? Any ordinary domestic tape recorder will do (I think). This goes for all other peripherals, too — a real and rare bonus (get out of *that,* Atari, — and you, too, Commodore!)

Then there's the programmable function keys. To use them is to love them. 'Nuff said.

'OK,' you say, 'Where's the catch?' To be honest there *is* a deficiency: — to wit, its notorious lack of usable RAM. This can be overcome in a number of ways (buy a second processor, get paged RAM, or use the paged ROM facility). When Acorn bring out the successor to the BBC 'B' I hope they remember this, though.

So, to wind up: the Acorn/BBC 'B' model is great. It's the best. It's highly expandable and has been planned from the start as the keystone or master component of a whole system. What more could anyone ask?

Well, since you mention it . . .

THE DREADNOUGHT FROM SILICON VALLEY

***TONY TYLER* puts the case for the rough, tough, powerful, versatile and heavily underrated ATARI 800.**

IT'S SQUAT and ugly and faintly bulbous — just concave enough to ensure that the manual keeps sliding off into your Tizer. It's gritty to the touch, and sprayed the colour of a dog-tired US Marine who's spent the last three nights in a wet foxhole. It's as American as a '55 Pontiac but not half so glamorous. The disc drive looks like a Baby Belling cooker — and makes as much noise as a clapped-out fridge in summer. It's unexpandable, and its annoying, in-house-only interface design means that you have zero choice in major peripherals. When launched four or so years ago it was an advanced design; but now, frankly, it's looking pretty long in the tooth.

Then why do I love it so?

You always have a special place in your heart for your first . . . micro (what did you think I was going to say?) — and me, I'm no exception. The Atari 800 was **my** *first micro; and while I freely acknowledge that there's 'better' hardware around, when I first laid claw — 18 months ago — on the packing polystyrene, this was not so obviously the case. Who competed? The BBC? Maybe — but it was, and still is, a lot dearer. The Com-64 was not then in UK shops, and the only other competitor, the Apple II, was (and still is) a pricier package by far.*

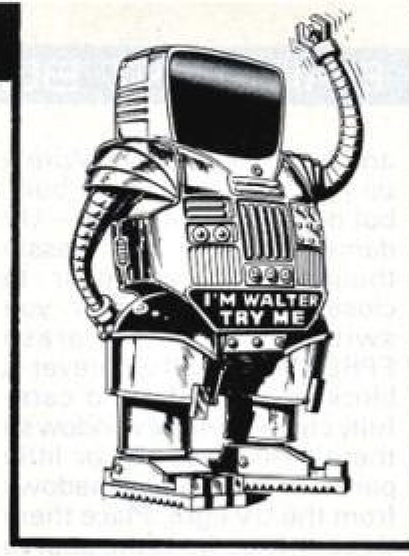
Now that the Atari 800 has come sharply down in price — so much so that you can often strike your own bargain — I suggest that it's a better bargain than ever before.

OK. First, casing and keyboard. This baby looks muscle-bound and is. Oaf that I am, I once left it switched on for nearly three days. The 800 shrugged this off as of no account. Yes, the pins in the i/o terminals are a trifle on the frail side, perhaps (untold story here), but unless you're crazed with impatience (as I was) it oughtn't to be a problem.

Solid Colours

The peripherals **work**. *So what if you need a separate (but identical) transformer for most of them? Who cares if it won't expand? With the obese but tough and versatile 800 you've got 37½ Big Ks (officially 48) to play with in freely available RAM (more if you disable the o/s), and eleven (count 'em) text/graphics modes. You've a palette of rich, solid, unflickery colours to dip into — the full 8-bit (255) string, in fact — and in some modes you can put 16 of these on the screen at any one time. Best resolution is only marginally less high than the Beeb's Mode 1. You can have text in all modes except the last three, either wholly or in a predefined window below the graphics area. The four-voice SOUND is excellent, and less cumbersome to program than*

Little Tin Guy...



The chip which today brings electronic warriors to your screen will one day bring the *direct experience* of them to your mind. Flat-screen TV mirrors many times the size of a TV set — which hang on the wall — will take a series of images and represent them as pure light rather than separate particles of energy exploding on to a sensitive surface as individual blips. A broad band of digital information, a channel, then allows the computer's output more closely to resemble or mimic the natural input.

Ultimate Game

An Israeli scientist has taught deaf people, including himself, to hear perfectly, and to be able to hold normal conversations. He did it by programming a tiny chip to compress sound waves. The broad channel of digital noughts and ones is then tapped out physically on a deaf person's bones. For human beings experience sounds as *physical* sensations as well as aural ones.

The ultimate video game will have bombs exploding *inside* your head! Ouch! On the way? Visual images, sound, perhaps even the "feelings" and "emotions" being processed by the machine will be delivered directly to the appropriate part of your brain, of your neural map, and so directly experienced. The ultimate on-line process.

Hai! Tech

A machine is being built — again, today — which will be able to respond to verbal human commands. The Japanese "Fifth Generation" project at their ICOT labs is using chips just as if they were no more than the simplest component.

A machine is being built — again, today — which will be able to respond to verbal human commands. The Japanese "Fifth Generation" project at their ICOT (not to be confused with Epcot, Walt Disneys' high-tech fun palace) labs is using chips just as if they were no more than the simplest component, as common-or-garden plugs to supply processing power.

The programs will process logical inferences, or ideas, rather than straight binary maths. A working prototype due out this year will handle 10 logical inferences per second (or LIPS, as they are known) — enough ideas, for example, to be able to describe what a computer or a TV set actually *is*. Their ultimate machine will run at many millions of LIPs, and be able to react *very* fast to questions.

The software which handles ideas is not processed sequentially, as in today's personal microcomputers. It is ingested as huge chunks by giant parallel processors — all in one mouthful. The Japanese have the basic chip technology to build the system; what they lack — no surprise here — is the software to make it all happen.

OK. Having the machine to process ideas is one thing, but being able to input the right idea, the one you really wanted is another. American big business is backing the software capable of putting all those LIPs to use, leaving it to the Japanese to make the hardware.

Two brands of software are emerging, and will be the most expensive (and profitable) parts of the machine's system.

Intelligent

An Intelligent Knowledge Base stores everything which is known about a topic — one day, every scrap

Continued on next page

Acorn's. And the ROM/disc drive/cassette versatility is of exceptional value seeing that Atari's range of plug-in software is umparalleled in the micro world (so what if the second slot is as redundant as a sixth toe? It isn't doing any harm, is it?).

I hope Atari International will forgive me if I say that despite these qualities the 800 has never really caught on here — to use the suit-and-tie-ism, its 'user base' is distinctly on the undernourished side. (Not so in the US.) One early reason was the gannet-like greed of the starting price — in the region of £500 for the micro alone, plus a particularly dreary, dense, hard-to-read and maths-obsessed BASIC manual. It tended, therefore, to fall between the Spectrum/ Vic end of the clientele and those loaded types who plumped straight off for Apple.

Less "Classy"

Like Apple, it was American. Not that there was, or is, any, er, nationalism involved; Sinclair just offered the best deal around, that was all (as he still does). No, the initial lack of relative interest in the 800 was — irony coming up — the very quality and range of compatible ROM games software. This, plus the equally conspicuous lack of 'serious' applications, gave it a name as an excellent 'games machine' — the best — but a rather less 'classy' micro (overall) than the Beeb.

You can have ordinary text in Mode 0, larger, wider text in 1, still larger in 2. In 3, 4, 5, 6, 7 and 8 you can have four lines of Mode 0 text in a window at the bottom. Colour palettes are allotted sensibly, with two shades of one (of 255) in 0, three in 1 and 2, four in three (lo-res graphics mode), three in the (higher-res) 4, four in 5 (medium-res), two in 6, four in 7 (hi-res), two in the highest-resolution mode — 8 — and multiple choice of shade and colours in 9, 10 and 11 (medium-hi).

You can plug in up to four joysticks, paddles or other devices at once. A new, added bonus is the vast amount of gourmet sticks and controllers now available for the Atari/Commodore/Coleco-compatible sockets, most of them US-made. This enhances Atari's now-permanent image as makers of the best pure-game computer hardware around.

All in all, the 800 is a proven, reliable, immensely strong, versatile machine with excellent graphics facilities and one of the easiest BASICs around. Its drawbacks — no PROCs, no lower-case commands, horrific circle and ellipse routines, a slow and memory-consuming fill (the unwieldy XIO statement), and the slowish clock speed — officially 1.8 mhz — are all livable with. While its range of advantages easily outweighs them.

Tarted Up

The 800 has now been 'superseded' — at least, such is the common opinion. Yet Atari's own new range — the 600XL and 800XL specifically — are little more than 400 and 800 guts tarted up with new cases and a HELP key. The bulbous original may be phasing 'out', but the innards — in their day, the most advanced available — live on. That's how advanced it was in the first place. These days it's a bargain as well.

Oh, and one last word. Absolutely none of the above applies to the 16K, flat-keyboard 400, which was, is and always will be — a Heap.



Big Hand for the Little Tin Guy...

of recorded information — in a kind of suspended animation. Just asking the right question, or even being in need of a particular item of information, will bring it tumbling out of the machine. This exists today, although it is relatively primitive, in the form of computer memory-storage called a database.

An Expert System, however, is more impertinent software — it doesn't wait to be asked! By picking a topic which the machine has some knowledge of, say the ancient art of computing, it prepares itself to hold a conversation with you. What is now being called the Man-machine Interface allows the machine to prompt you, to try and find out what it is you need to know. Again, these systems are in their infancy today.

Really wild style is not programming, but cloning a machine to be grown into a larger, more articulate system — a creature with it own life, but still basically a machine. Elementary biology and human frailty show us that we too are machines, albeit deluxe organic models. Biotechnology is already closely allied to computer technology and the resemblance is increasing.

How to Play

A VIDEO game, played in the year 2000, will probably go something like this.

Player One tells the machine what he wants to "play", or "do" and what he would like the "game", or "event" to be like. Physical "games" are played with robots, even humanoid figures with realistic skin, hair and teeth. Action can be stimulated directly in the brain, to conjure up any scene or any sensation. Images might also be presented conventionally — as a backup — on screens metres high, or as 3D laser holograms all around the body.

Players Two, Three and Four might share in this fantasy, and the whole experience will be saved for repetition. Or even sale.

And then, my friends, your wildest dreams will surely become the true source of every passing reality.

Think about it . . .

 Continued from page 77

and a clip for the bulb. Wire it up just like an ordinary bulb, but don't look at its light — UV damages eyes. No hassle though, just remember to close the case when you switch it on! To erase EPROMs, peel off whatever is blocking the light and carefully clean the little window so there's no smearing or little particles to cause shadows from the UV light. Place them three inches from the source and let them have it for about fifteen minutes. Then check them using function A on the Programming Program for erasure. If it replies with 'non erasure at xxxx' then give the EPROM another couple of minutes under the UV source.

Okay, so up to now we've got the unit reading properly and the 21V is available to the ZIF whenever you hit the switch S1. Writing to an EPROM consists of setting up the appropriate address and data lines, and pulling pin 27, the PGM line, low for around 50ms. After 50ms have passed, you push the line back high, move to the next address and set up the next data value, then pull the PGM down for another 50ms and so on. During the 50ms PGM is low the EPROM accepts the 21V and 'burns' any zeros it finds in the data lines into the appropriate location. The 50ms has got to be fairly exact, as you can only go 5ms either side. Programming an 8K 2764 at twenty bytes a second (50ms) will take around 7 minutes. This slow speed is a function of the EPROM, not the programming algorithm, which is written in machine code.

The program first asks you which sort of EPROM you want to program, 8 or 16K, then asks you to enable S1 and hit any key. It then begins the programming process. It sets up the address and data lines for each byte and uses the user VIA inside the BBC, IC69, as a timer for the 50ms. If you're using a BBC A with 16K of RAM added, then you'd better have the user VIA as well! (come to think of it, you can't run half of Acornsoft's games without it, so you've probably got one

Continued on page 99

The driving Software for the BIG K Custom EPROM Programmer

```
LIST
    0REM "Andy Green's EPROM PROGRAMMER
BIG K issue 1"
    5DIMU% 500
   10MODE7:GOSUB600:CALLINIT:VDU23;8202;
0;0;0
   20SP$=CHR$31+CHR$0+CHR$23+CHR$129+CHR
$157+CHR$135+"      <SPACE>"+CHR$135+"fo
r Main menu"
  100PROCmenu(CHR$131+"Main Menu","Test
EPROM for erasure/Load EPROM to buffer/D
ump out to EPROM/Verify buffer against E
PROM/*")
  110IFI%=-1THEN100
  120ONI%GOTO150,200,250,300
  150PROCmenu(CHR$134+"Checking the EPRO
M for erasure",""):CALLBUFFF:IF?&75=0THE
NPRINTTAB(5,12);"Non-Erasure at ";~(!&71
)AND&FFFF:GOTO190
  180PRINTTAB(6,12);CHR$(130);"Confirm E
PROM total erasure"
  190PRINTSP$:REPEAT UNTIL GET=32:GOTO10
0
  200PROCmenu(CHR$134+"Load EPROM to buf
fer","8K (EP)ROM 2764/16K (EP)ROM 27128/
*")
  210IFI%=-1THEN100
  220?&74=&20:IFI%=2THEN?&74=&40
  230CALLBUFREAD:VDU7:GOTO100
  250PROCmenu(CHR$134+"Blowing the EPROM
 from buffer","8K (EP)ROM 2764/16K (EP)R
OM 27128/*")
  260IFI%=-1THEN100
  270?&74=&20:IFI%=2THEN?&74=&40
  275PROCmenu(CHR$134+"Blowing the EPROM
 from buffer",""):PRINTTAB(4,11);"Flick
the 21V switch for Red Light";TAB(11,13)
;CHR$(130);"then press any key":A%=&31:C
ALLSEND:A=GET:PROCmenu(CHR$134+"Blowing
the EPROM from buffer","")
  280CALLBUFBLOW:VDU7:PROCmenu(CHR$134+"
Blowing the EPROM from buffer",""):PRINT
TAB(4,11);"Flick the 21V switch to kill
Light";TAB(11,13);CHR$(130);"then press
any key":A=GET:GOTO100
  300PROCmenu(CHR$134+"Comparing EPROM t
o Buffer","8K (EP)ROM 2764/16K (EP)ROM 2
7128/*"):IFI%=-1THEN100
  305*FX12,2
  310?&74=&20:IFI%=2THEN?&74=&40
  320PROCmenu(CHR$134+"Comparing EPROM t
o Buffer",""):PRINTTAB(2,12);CHR$133;"Co
mparing the EPROM and Buffer now":CALLBU
FCOM:IF?&75THENPRINTTAB(2,12);CHR$130;"
   EPROM CHECKS OUT EXACTLY      ":GOTO3
40
  330PRINTTAB(2,12);CHR$134;"  No Match
at EPROM address &";~(!&71) AND&FFFF;"
  "
  340PRINTSP$
  350REPEAT UNTIL GET=32:GOTO100
  499END
  500DEFPROCmenu(T$,S$):CLS:PRINTTAB(0,0
);CHR$132;CHR$157;TAB(0,1);CHR$132;CHR$1
57;TAB((40-LEN(T$))/2,0);CHR$141;T$;TAB(
(40-LEN(T$))/2,1);CHR$141;T$:T%=1
  505IFS$=""THENENDPROC
  510S%=INSTR(S$,"/"):PRINTTAB(2,T%*2+4)
;CHR$(64+T%);"  ";LEFT$(S$,S%-1):S$=RIGH
T$(S$,LEN(S$)-S%):T%=T%+1:IFS$<>"*"THEN5
10
  525IFT$<>CHR$131+"Main Menu"THENPRINTS
P$
  530I%=INKEY(0)
  535IFI%=32THENI%=-1:ENDPROC
  540IF(I%<65)OR(I%>64+T%)THEN530
  550I%=I%-64:PRINTTAB(0,I%*2+4);CHR$(13
6);:ENDPROC
  600FORY%=0TO2STEP2:P%=U%:[OPTY%:.ADCLR
 LDA&70:AND#&F2:JSRSEND:LDY#0:.KKI INY:B
NEKKI:LDA&70:ORA#1:STA&70:JSRSEND:LDA#0:
STA&71:STA&72:TAY:TAX:.KKP INY:BNEKKP:IN
X:CPX#4:BNEKKP:RTS
  605\
  610.ADINC INC&71:BNEP%+4:INC&72:LDA&72
:AND#&30:LSRA:LSRA:STA&73:LDA&70:AND#&F1
:ORA&73:ORA#1:STA&70:ORA#2:JSRSEND:LDX#&
F0:JSRDELAY:LDA&70:JMPSEND
  615\
  620.BREAD LDA&70:AND#&EF:JSRSEND:LDA#0
:STA&FE62:LDX#&F0:JSRDELAY:LDA&FE60:STA&
73:LDA&70:ORA#&10:STA&70:JSRSEND:RTS
  625\
  630.SEND PHP:SEI:PHA:LDA#&FF:STA&FE62:
PLA:STA&FE60:LDA#&E0:STA&FE6C:LDX#&F0:JS
RDELAY:LDA#&C0:STA&FE6C:LDX#&E8:JSRDELAY
:PLP:RTS
  635\
  680.INIT LDA#&31:STA&70:JMPSEND
  685\
  690.BUFREAD SEI:JSRADCLR:.B1 JSRBREAD:
JSRADB:LDA&73:LDY#0:STA(&71),Y:JSRADN:JS
RADINC:JSRREASSURE:LDA&72:CMP&74:BNEB1:C
LI:RTS
  695\
  700.ADB LDA&72:CLC:ADC#&30:STA&72:RTS:
.ADN LDA&72:SEC:SBC#&30:STA&72:RTS
  705\
  710.BUFFF JSRADCLR:.BF1 JSRBREAD:LDA&7
3:CMP#&FF:BNEBF2:JSRADINC:JSRREASSURE:LD
A&72:CMP#&40:BNEBF1:LDA#1:STA&75:RTS:.BF
2 LDA#0:STA&75:RTS
  715\
  720.REASSURE LDA&71:BNEP%+3:RTS:LDA&72
:LSRA:LSRA:LSRA:LSRA:ORA#&30:STA&7C88:LD
A&72:AND#15:CMP#10:BCSALPH:ORA#&30:STA&7
C8C:RTS:.ALPH CLC:ADC#55:STA&7C8C:RTS
  725\
  730.BUFBLOW SEI:LDA&FE6C:ORA#&10:STA&F
E6C:JSRADCLR:.BB1 LDA&70:ORA#&60:STA&70:
JSRSEND:.BB2 LDA&FE6B:AND#&3F:STA&FE6B
  740SEI:LDY#0:JSRADB:LDA(&71),Y:PHA:JSR
ADN:LDA&70:AND#&DF:ORA#&10:JSRSEND:PLA:S
TA&FE60:LDA#0:STA&FE66:LDA#&C3:STA&FE67:
STA&FE65:LDA#64:.BB3 BIT&FE6D:BEQBB3:LDA
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  760.BUFCOM SEI:JSRADCLR:.BC1 LDY#0:JSR
ADB:LDA(&71),Y:PHA:JSRADN:JSRBREAD:PLA:C
MP&73:BNE SCREWUP:JSRREASSURE:JSR ADINC:
LDA&72:CMP&74:BNE BC1:STA&75:CLI:RTS:.SC
REWUP LDA#0:STA&75:CLI:RTS
  770.DELAY INX:BNEDELAY:RTS
  780.EPCOP LDA#2:STA&FE30:LDY#0:LDA#&80
:STA&71:LDA#&30:STA&73:LDA#0:STA&70:STA&
72:.HHH LDA(&70),Y:STA(&72),Y:INY:BNEHHH
:INC&71:INC&73:LDA&71:CMP#&C0:BNEHHH:LDA
&F4:STA&FE30:RTS
800]:NEXT:RETURN
```

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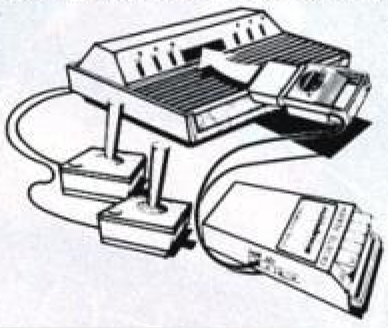
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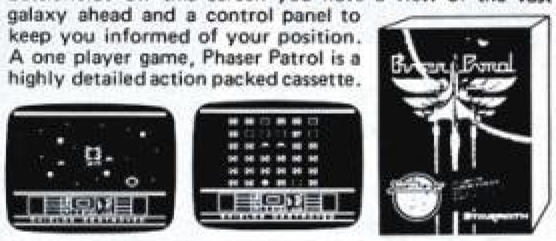
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Phaser Patrol is a single load game which is FREE with the Supercharger unit. A space game, it has two screens, one featuring the intergalactic battlefield, (below left), and the other showing a Sector Map (below right). The game begins when the devious 'Dracons' launch a surprise attack and you belong to the force which must prevent them from reaching earth. The sector map enables you to warp-hop from one sector to another and it also tells you in what areas the Dracon ships are, so you will need to refer to it before you go into battle. As well as telling you the location of the Dracons, the map shows you where your starbases are, these can bail you out if you get into any trouble. When you have decided on the sector of Dracons to attack, you can go on to the second screen, the battlefield. On this screen you have a view of the vast galaxy ahead and a control panel to keep you informed of your position. A one player game, Phaser Patrol is a highly detailed action packed cassette.



MUTANTS FROM SPACE



Single Load action from Starpath, just as soon as you begin this game you will be under attack. Your task is to vapourize the mutant warriors before they overrun your home planet. Up to four can play and the screen keeps track of the highest score. As well as having nine difficulty levels and two speeds, Communist Mutants from Space (it's full title), has got several features which make it an exciting game cassette providing a variety of options. The real skill in this game however, is winning without using the special features that it offers you!

Price: £8.65 + VAT = £9.95

FIREBALL



You are a juggler, and able to juggle anything from china plates to daggers! Your task in this Single Load game is to smash wall after wall of blocks as you juggle with red hot FIREBALLS! When the ball comes down from the top of your screen, catch it, and then release it back at the wall of blocks. You can score up to a million points! And, if you get to proficient at one pattern of blocks, there are another four to choose from! Up to 4 players can take part in this game and up to 6 fireballs can appear on the screen at once. Be sure you don't get burned!

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KILLER SATELLITES



You are the only test pilot of the one rocket ship that can protect the earth from an alien attack of molten metal. The invasion has started, have you the courage and skill to save mankind? A Single Load game, Killer Satellites is for 1 player featuring 2 difficulty settings as well as a 'rapid fire' mode. Other features include: a fuel level indicator; a laser overheat monitor which indicates the temperature of your gun; a global radar scanner and an energy barrier, which can be used to protect you from some of the alien projectiles . . . . but not all of them!

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SUICIDE MISSION



Your mission in this game is to shrink down, smaller than a speck of dust, to do battle with a deadly killer virus deep within a human body. Equipped with a microscopic submarine, head for an infection, perilously close to the heart, and towards a fight where you are heavily outnumbered. This is arterial warfare at it's finest. Fire at one of the many germs, and it divides into two. Fire again and the numbers increase once more. A 1 or 2 player game featuring protective shields and two different shooting styles, Suicide Mission has three difficulty options.

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DRAGONSTOMPER



Dragonstomper is one of Starpath's Multi-Load cassettes. An adventure game, you've been swept through a time tunnel, right back to the age of warlocks and wizardry. Your mission is to find the Amulet of the Druids. There are clues, but not all easy ones. There are peaceful lakes and forests as well as deadly perils and lurking somewhere is a very vengeful dragon. There are many rewards along the way, but few will reach the final goal. The MULTI LOAD feature gives you THREE seperate game segments, for longer, more challenging game play.

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ESCAPE/MINDMASTER



A Multi-Load cassette, your task in this game is to escape from the alien Mindmaster's laboratory, where he has held you as a specimen for study. To win your freedom, you must pass through six 3-D mazes, with each of them being more complex than the last. The first 5 mazes have problems to solve and some surprise intelligence tests. The sixth maze is something special! As this game is too complex to load into your Atari at one time, it loads in FOUR different sections, a feature of the extra play power of the Starpath MULTI LOAD cassettes.

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In a fast moving market like video games, it is difficult to keep up to date with all the developments that take place. With new programmes and accessories being introduced at a fast rate by several different manufacturers, it is impossible to get all the information you require from one manufacturer alone. It is for this reason, that we have set up owners clubs for the more popular video games and home computers, to keep you fully up to date with what is going on with your particular machine. As far as we know, Silica Shop are the only company to offer such clubs, but that is not surprising since we are the specialists. We currently have **FREE** clubs for the **Atari VCS**, **Atari 400/800** home computers, and **Mattel Intellivision**. Soon we will have clubs for **Colecovision**, **Aquarius** and **Vectrex**. So if you own one of these machines, fill in the coupon opposite, and we will enrol you **FREE OF CHARGE** in the club relevant to your computer or video game.

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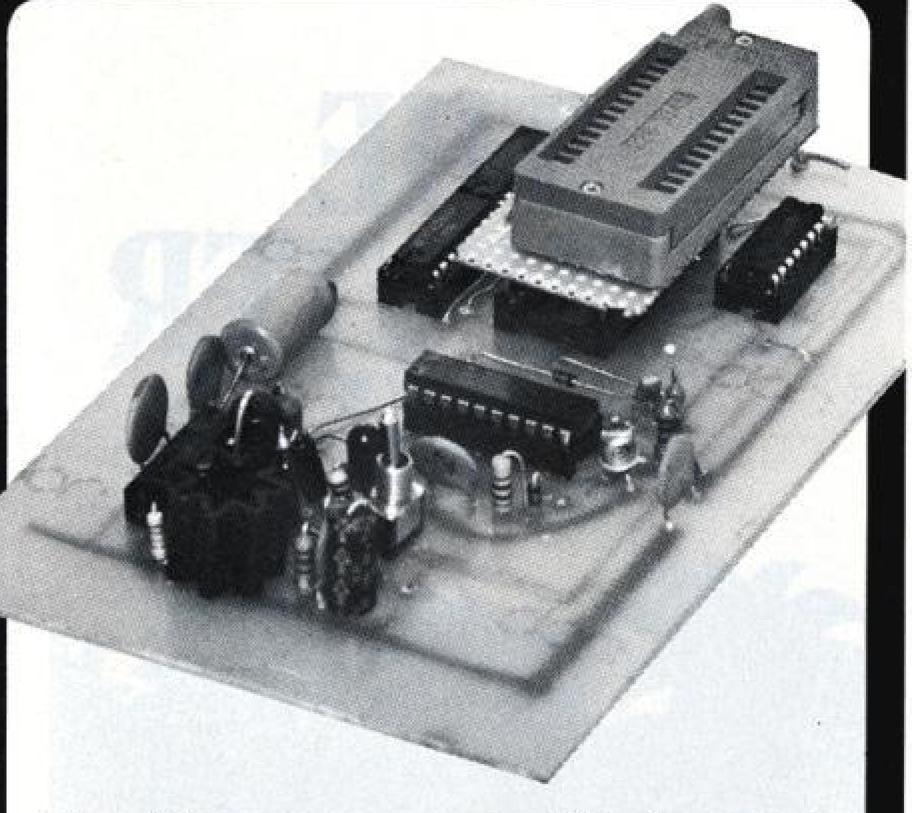
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of these VIAs anyway.)

After seven or fourteen minutes, depending on whether you use the 2764 or 128, the program asks you to disable S1 to switch off the 21V power to the ZIF. YOU MUST DO THIS BEFORE REMOVING THE EPROM!!!! Otherwise you may find yourself needing a new EPROM!

Corrupt Option

Note that when programming an EPROM, a copy of RAM from &3000 onwards is burnt into the EPROM in the ZIF. In the case of a 2764, then, from &3000 to &4FFF are burnt in. Its up to you to *LOAD or otherwise get the correct data into this area before running the Programming Program.

Remember that using option B will corrupt this area, so don't painstakingly load several files into the buffer area, then decide to see what's on the EPROM already — THEN use option C to burn the buffer area in — otherwise nothing will happen! If you want to be sure that the EPROM currently in the ZIF is erased just before programming it, use option A which doesn't corrupt the buffer area.

After programming, you might like to use option D which reads in from the EPROM byte by byte and compares each byte with the corresponding one in the buffer. Any discrepancy is announced together with the addresses of the byte that went wrong.

That just about wraps up the EPROM epic for this month. Next month I'll be telling you how the BBC talks to its sideways ROMs and how to make your own!

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TONY BENYON

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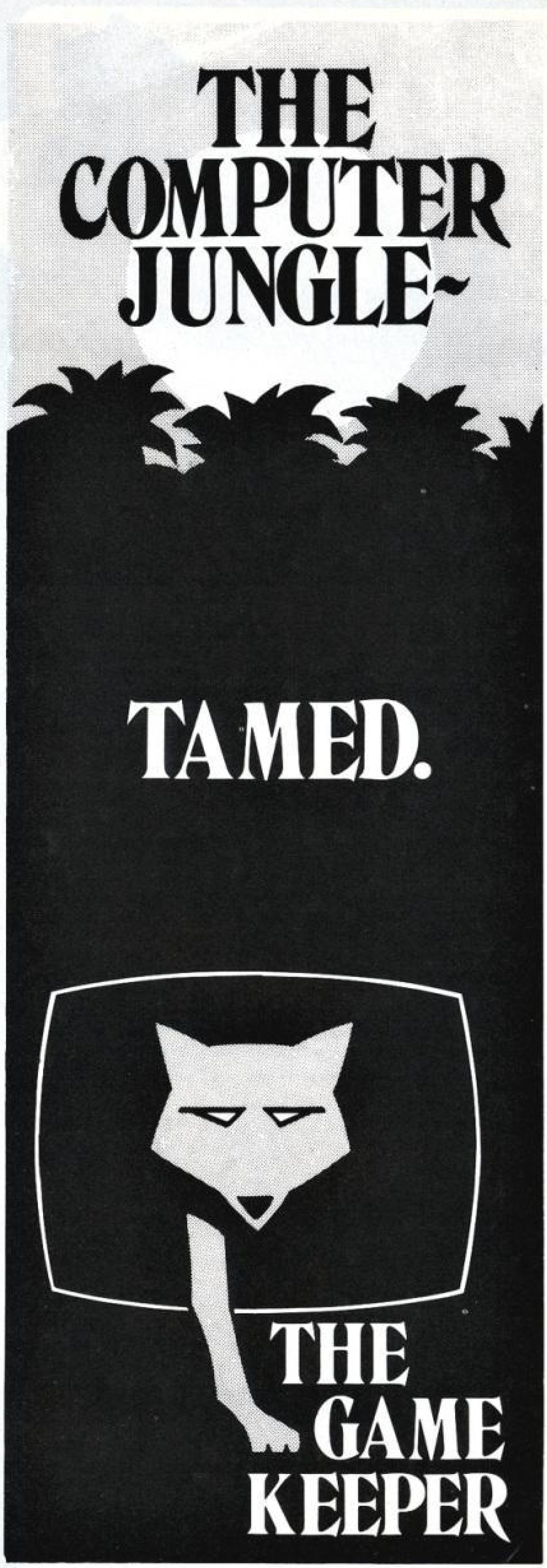
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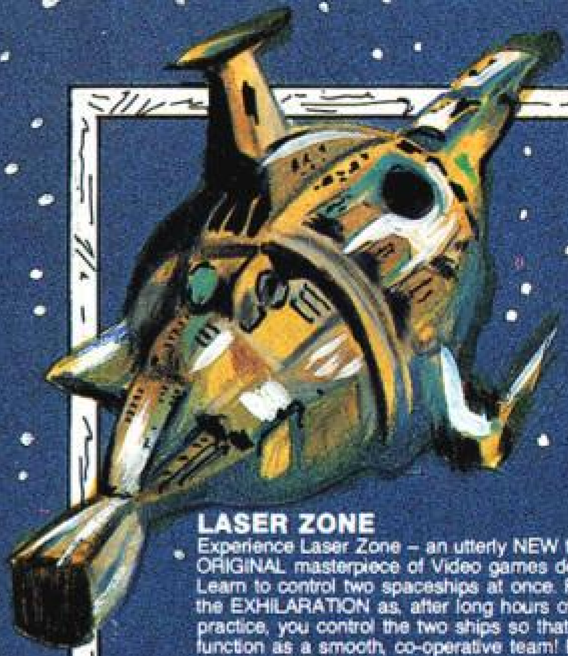
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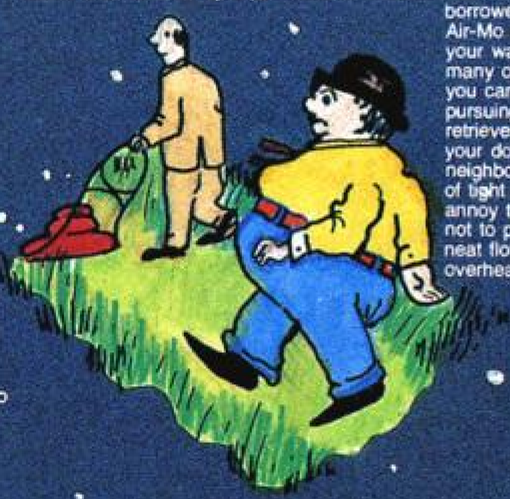
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